

OFFICIAL TRANSCRIPT
PROCEEDINGS BEFORE

FEDERAL TRADE COMMISSION

DKT/CASE NO.: P951201

TITLE: HEARINGS ON GLOBAL AND INNOVATION-BASED
COMPETITION

PLACE: Washington, D.C.

DATE: October 24, 1995

PAGES: 747 through 901

C O R R E C T E D C O P Y

Meeting Before the Commission

HERITAGE REPORTING CORPORATION

Official Reporters
1220 L Street, NW, Suite 600
Washington, D.C.
(202) 628-4888

Date: October 24, 1995
Docket No.: P951201

FEDERAL TRADE COMMISSION

I N D E X

<u>WITNESS:</u>	<u>EXAMINATION</u>
Presentation by:	Page:
Professor David Mowery Sloan Foundation Semiconductor Study University of California at Berkeley	752
Richard Donaldson Texas Instruments	784
Professor David J. Teece University of California at Berkeley	812
Professor Lawrence White New York University	838
Judy Whalley Howrey & Simon	846

E X H I B I T S

FOR IDENTIFICATION

Commission's:

None.

Heritage Reporting Corporation
(202) 628-4888

FEDERAL TRADE COMMISSION

In the Matter of:)
)
) Docket No.: P951201
HEARINGS ON GLOBAL AND)
INNOVATION-BASED COMPETITION)

Tuesday,
October 24, 1995

Federal Trade Commission
Sixth and Pennsylvania Avenues
Room 432
Washington, D.C. 20580

The above-entitled matter came on for hearing,
pursuant to notice, at 9:30 a.m.

Heritage Reporting Corporation
(202) 628-4888

SPEAKERS:**FEDERAL TRADE COMMISSION:**

ROBERT PITOFSKY
Chairman

ROSCOE B. STAREK, III
Commissioner

JANET D. STEIGER
Commissioner

CHRISTINE A. VARNEY
Commissioner

SUSAN S. DE SANTI
Director, Policy Planning

JONATHAN B. BAKER
Director, Bureau of Economics

WILLIAM E. COHEN
Project Director, Innovation Policy Planning

DEBRA A. VALENTINE
Deputy Director, Policy Planning

MELISSA HEYDENREICH
Staff Policy Planning

SPEAKERS:

PROFESSOR DAVID MOWERY
Sloan Foundation Semiconductor Study
University of California at Berkeley

RICHARD DONALDSON
Texas Instruments

PROFESSOR DAVID J. TEECE
University of California at Berkeley

PROFESSOR LAWRENCE WHITE
New York University

JUDY WHALLEY
Howrey & Simon

1 COMMISSIONER VARNEY: Good morning. Welcome to
2 day six of our hearing. Today we will talk about how
3 innovation occurs and how businesses view competitive
4 substitutes in fast-changing industries.

5 We are delighted this morning to start the
6 discussion with Professor David Mowery, professor of
7 business and public policy in the Walter A. Haas School of
8 Business at the University of California, Berkeley. He is
9 also research associate of the Canadian Institute of
10 Advanced Research. In addition, Dr. Mowery serves as the
11 deputy director of the Consortium on Competitiveness and
12 Cooperation, a multi-university research alliance dedicated
13 to research on technology management and U.S.
14 competitiveness.

15 In the past, Dr. Mowery has taught at
16 Carnegie-Mellon University and, among other things, served
17 as the study editor for the Panel on Technology and
18 Employment of the National Academy of Sciences.

19 Dr. Mowery received his undergraduate and Ph.D.
20 degrees in economics from Stanford University and was a
21 post-doctoral fellow at the Harvard School of Business.

22 We are delighted you are able to join us this
23 morning. Thank you.

24 PROFESSOR MOWERY: Thank you very much. I
25 appreciate the invitation to come here and talk about a

1 couple of pieces of work that I and colleagues at Berkeley
2 have been carrying out on innovation in the semiconductor
3 industry. I am going to try to summarize two pieces of
4 research. The first deals with the management and the
5 consequences of management of new process introduction, the
6 development, transfer and introduction into manufacturing of
7 new process technologies within the global semiconductor
8 industry. And the second piece of research deals with the
9 paper on an evaluation of the SEMATECH manufacturing
10 technology consortium that I and some colleagues at Berkeley
11 have carried out.

12 This work draws on a research project undertaken
13 by the business school and the College of Engineering at UC,
14 Berkeley, which has been financed by the Sloan Foundation,
15 and this research has involved doing mail surveys and
16 detailed, on-site field work on manufacturing performance at
17 the level of individual production establishments,
18 individual fabs or fabrication plants as they are known in
19 semiconductor industries of the U.S., Taiwan, Western Europe
20 and Japan. So, we have been able to collect data at the
21 level of individual products and processes at a level of
22 detail that I think is largely without peer in most of the
23 empirical work on this industry.

24 Let me just summarize, then, what is in the -- a
25 statement of sorts, it's really sort of a statement

1 consisting of a list of points on new process introduction
2 and suggest a few implications. I'm here speaking as an
3 economist with some expertise on the semiconductor industry,
4 not as an expert on antitrust or competition policy. And
5 then I'll go on and talk about SEMATECH.

6 Semiconductor manufacturing is probably nearly
7 unique among high-technology industries in combining three
8 characteristics, each of which has some parallels in other
9 industries but the combination of which in the semiconductor
10 industry may be unique.

11 The first is the sheer complexity of the product
12 and process technologies, meaning that the ability of a
13 manufacturer to predict the performance of a new
14 manufacturing process is very limited. In effect, you are
15 not able -- you are dealing here with a technology that in
16 some sense has a relatively modest scientific or theoretical
17 underpinning. It's developed on the basis of trial and
18 error in many cases and is developed in an atmosphere of
19 considerable uncertainty, which makes it very difficult to
20 predict the performance of a new manufacturing process,
21 particularly in the -- in a high-volume, commercial-scale
22 manufacturing establishment in advance of its introduction.
23 So, a fairly high uncertainty, specifically with respect to
24 the process technology.

25 The process technology and the product

1 technologies are very tightly interconnected in this
2 industry and probably more and more so. That is to say,
3 these links have increased in tightness and complexity over
4 the last 20 years. So, it is to a much greater extent than
5 in an industry like automobiles, for example. It is almost
6 impossible to introduce a new generation of products without
7 simultaneously bringing in a significant change in your
8 manufacturing process technology. And when I say
9 significant change, I mean changing perhaps one-third to
10 one-half of the 100-plus steps in the process, bringing in a
11 substantial complement of new equipment, and, in many cases,
12 reorganizing the manufacturing process. So, very
13 significant change associated with the process if you are
14 going to manufacture a new product.

15 The third characteristic that makes new process
16 technology and the management of its development and
17 transfer so important is the fact that in this industry, we
18 have relative -- we have very intense levels of product
19 competition, and we have relatively short periods of time
20 during which one is a producer of a product with few or no
21 competitive offerings.

22 Therefore, rapid introduction of a new process and
23 the ability to expand the volume of product moving through
24 that process, the ability to, as it were, ramp your volume
25 of wafer production very quickly is extremely important to

1 profitable competition in this industry, simply because your
2 window of opportunity is relatively brief, and therefore,
3 it's important to move quickly and to move -- to move
4 quickly with relatively high quality, that is to say, low
5 levels of defects and the ability to expand output rapidly.

6 Now, I go on and summarize in my statement some of
7 the findings of our work that purports to explain
8 performance of individual fabrication plants in taking and
9 rapidly ramping a new manufacturing process. I think there
10 are a couple of important characterizations of the data on
11 the performance of individual fabs that are important. The
12 first is simply the substantial differences among individual
13 fabs in their performance. That is to say, we see quite a
14 spread within our data of the level of defects when the
15 process is first introduced into the fab and also we see
16 substantial differences in the ability of individual fabs to
17 improve the process over the first two to three years. This
18 is -- in my statement, there are some plots in between pages
19 3 and 4 that display these data.

20 A second finding or conclusion just in terms of
21 characterizing the data is the length of time during which
22 the penalty -- and here we're talking about an economic
23 penalty -- associated with a poor start persists. That is
24 to say, a poor starter, particularly in a more advanced
25 class of product and process technologies, takes a long time

1 to overcome the effects of a poor start and, indeed, to
2 catch up with the best performers within a product class.
3 And the ability of poor starters to catch up is more
4 constrained and is less pronounced in more advanced
5 products. That is to say, products with narrower line
6 widths of the features that -- simply narrower, smaller
7 lines -- on the chip itself, which require more advanced
8 process technologies. So, you see that the penalties of a
9 late start are more enduring and the ability to catch up in
10 more advanced technologies with the leaders is in many
11 respects more constrained.

12 What are some of the characteristics of best
13 practice in new process development and introduction that
14 our research tends to point to? There are a number of
15 these, I think, and this draws both on our collection of
16 data from a large sample of fabs and then more detailed work
17 on a very small sample of individual fabrication
18 establishments that we have been carrying out subsequent to
19 the mail surveys and -- field visits to this large sample.

20 There are probably upwards of about five to eight
21 of these. The first is the importance of moving people
22 around between the -- what is in many cases a dedicated
23 development site and the manufacturing fab. A second is the
24 use of a dedicated, essentially laboratory-scale --
25 actually, greater than laboratory scale -- development

1 fabrication facility within which a new process is developed
2 and is run at some semi-commercial or very low level of
3 output. If you can think about this as analogous to a
4 pilot plant in the chemicals industry, a semi-scale fab that
5 reproduces some but not all of the characteristics of the
6 high-volume, commercial-scale development facilities.

7 A third characteristic that is associated with
8 best practice or relatively good performance is duplication
9 of the equipment set. That is to say, you're dealing in
10 many cases with a new process with significant numbers of
11 pieces of new equipment, and what we find is that the firms
12 who perform best in this process are those who try to
13 duplicate as precisely as possible the equipment and in many
14 cases the materials that they use in their development site
15 with what they use in their commercial scale fabs. This is
16 quite an expensive and complex thing to manage. So, it's
17 easy to say and very hard to implement in many cases.

18 A fourth characteristic of best practice is a very
19 careful and in many cases multi-generational planning, if
20 you will, of product and process development that the best
21 firms undertake in such a way as to avoid developing and
22 being forced to utilize an entirely new process on an
23 entirely new product simultaneously. So, what you will do,
24 for example, if you are an Intel -- and what Intel is doing
25 now, as a matter of fact -- is you will take your flagship

1 product, your Pentium chip, for example, and you will
2 develop a smaller version of that chip, a so-called shrink
3 of the die, and on this modified version of an established
4 product, you will introduce a series of new steps.

5 So, you will bring new process steps up on
6 established product designs, or at least modifications of
7 established product designs, so that you are constantly
8 alternating, rather than suffering from what's known as the
9 new-new problem, new process, new product design. But this
10 requires very careful planning and requires that you as an
11 individual firm, as a corporate technology manager, be able
12 to plan several years, several generations of products and
13 equipment into the future.

14 Finally, the use of the development fab itself is
15 quite important. Again, keeping in mind the severe
16 uncertainties that are characteristic of new process
17 development in this technology, we find that best performers
18 in many cases maintain operation of a new process in the
19 research facility, in the development fab, for several --
20 perhaps six quarters, perhaps as long as 18 months after
21 that process has been released into the commercial scale
22 production environment.

23 This is done because, again, of the severe
24 uncertainties that in here, in new process development
25 transfer, you need to maintain a very reliable,

1 well-characterized benchmark process in order to understand
2 what's going on, if suddenly in your large-scale production
3 facility you have a significant crash or departure in
4 performance from your established trend performance.

5 Finally, our research suggests that the rate of
6 improvement in the new process once being produced, that is
7 to say the rate of learning and what most economists have
8 characterized as the learning curve following the
9 introduction of a new process, is, in fact, not solely a
10 function of increased volume but really can be managed and
11 does reflect the systematic allocation of engineering effort
12 to experimentation, running of test lots and the like in the
13 production fab. So, learning to a significant degree is
14 endogeneous, is something subject to managerial control and
15 discretion, I think, at least within the sample of firms
16 that we have looked at.

17 So, I think that just suggesting a couple of
18 implications of this work, as I say, semiconductors are in
19 many respects an extreme example of a more common phenomenon
20 and perhaps a phenomenon that is going to characterize
21 industries such as pharmaceuticals in the future in which
22 the process and the product technologies and the management
23 of their innovation are tightly coupled, in which you have a
24 high level of firm specificity. That is to say, you see
25 significant differences among firms in their approach to and

1 their success at managing the joint development of product
2 and process innovation, and that in turn tends to -- can
3 make it very difficult to transfer product technologies or
4 even to create markets for licensing of product technologies
5 among firms, simply because a great deal of the knowledge is
6 not embodied in anything that's written down, it's tacit, as
7 Professor Teece will talk about perhaps this afternoon.

8 There is also such severe uncertainty that even
9 moving a manufacturing process among the plants owned by a
10 single firm, moving an established manufacturing process
11 among the fabrication plants operated by a Texas Instruments
12 or an Intel is very difficult and requires enormous and
13 careful management of things like precise duplication of
14 equipment sets, et cetera. You can imagine how much more
15 difficult it is to move a process among firms through an
16 arm's length contract.

17 A third implication -- and that, I think, is
18 something that comes up in looking at SEMATECH, is that
19 because of the -- of the importance of new equipment and new
20 materials, when you're developing a new process, the
21 collaboration and the communication between vendors of
22 equipment and materials and the manufacturers plays a very
23 important role, I think, in developing these new processes,
24 but this general notion that the technology in many respects
25 in semiconductors is moving more rapidly than the science, I

1 think, is one that, again, is not unique to semiconductors.

2 You're really dealing here with this technology
3 whose practitioners understand that through trial and error
4 they can achieve a certain effect, but in many cases, they
5 are not able to predict precisely how, when and why that
6 effect will be achieved. And therefore, this is why you
7 have such a premium placed on experimentation and the
8 development of semi-scale development facilities and,
9 indeed, one sees such severe complexity associated with
10 development and transfer.

11 Okay, let me summarize, perhaps, at least as
12 quickly, the work on SEMATECH that we have been undertaking.
13 This has been work undertaken, as I say, with colleagues at
14 Berkeley that has also benefitted substantially from the
15 cooperation of senior staff and many of the firms
16 participating in SEMATECH. Most of you are familiar with
17 SEMATECH, which was established in 1987-'88 to conduct
18 research on a collaborative basis among 14 U.S.
19 semiconductor manufacturing firms on manufacturing process
20 technology. SEMATECH is funded from industry, federal and
21 state government sources. The federal contribution if --
22 well, at least has been planned to end after 1996. It may,
23 in fact, end I guess a year earlier than that, but the plan
24 is perhaps for it to end after 1996.

25 SEMATECH has been cited I think fairly widely as a

1 successful example of industry-led collaborative R&D with
2 public financial support. Both the U.S. semiconductor
3 manufacturers and U.S. semiconductor equipment firms' global
4 market shares have improved since the founding of SEMATECH,
5 and this has been attributed in part to SEMATECH's
6 operations and support for collaborative research. SEMATECH
7 has also served, to some extent, as a model certainly in the
8 policy community for other consortia proposed or established
9 in its wake.

10 Now, in looking at SEMATECH, I think certainly
11 there are a number of questions. One is a factual one,
12 quasi-factual one, of its contribution to the improvement of
13 competitiveness of the U.S. manufacturing industry -- and
14 semiconductor manufacturing industry, but also SEMATECH, I
15 think, because of its relatively substantial period of
16 operation, the transparency with which it has been
17 established and the detail in which it has been covered by
18 journalists and others, it also lays out and allows one to
19 consider a number of issues, more generic issues, in the
20 design and the management of R&D consortia. And I think you
21 can -- you can see at least three key problems that are
22 associated with R&D consortia, all of which SEMATECH has had
23 to address and the resolution of which has played a very
24 important role in SEMATECH's evolution since its
25 establishment.

1 The first is establishing a research agenda,
2 something that proved, in fact, to be quite difficult in the
3 context of SEMATECH when it was first established, in part
4 because of the firms' specificity, if you will, and the
5 competitive importance of process technologies controlled by
6 the individual member firms. It turned out to be much more
7 difficult than many of the founders and certainly the
8 designers of SEMATECH envisioned to work out a common agenda
9 for joint research on a manufacturing process or a set of
10 processes that would be essentially disseminated among all
11 of the firms. So, simply working out an area of common
12 ground in sort of horizontal research on manufacturing
13 processes turned out to be extremely difficult, and, in
14 fact, the eventual agenda of SEMATECH reflected a rather
15 different resolution of this conflict than many of the
16 architects originally envisioned.

17 A second problem is getting the results of
18 research in consortia out to the member firms. That is to
19 say, transferring the results to members. This is something
20 that other consortia in the U.S., other consortia in Western
21 Europe and to some extent in Japan have experienced problems
22 with, and it's something that even within SEMATECH I think
23 you can see that different member firms have experienced
24 differential levels of success.

25 A third issue is adapting the research agenda to

1 change, change either resulting from a lack of agreement
2 among member firms on the agenda or change in the -- in the
3 broader industrial or technological environment. What we
4 see, I think, is that SEMATECH has managed to address all of
5 these challenges. The agenda has been adapted. In effect,
6 you have seen a significant shift from horizontal work,
7 horizontal collaboration on a set of manufacturing processes
8 that would essentially define a benchmark or define a
9 state-of-the-art process that would be diffused among the
10 member firms to a more vertical collaborative design that
11 has emphasized collaboration among the manufacturers who are
12 members of SEMATECH and U.S. equipment manufacturers and to
13 some extent material suppliers. So, you have really seen a
14 shift from generic process development to a more focused
15 collaboration on improvement or in some cases development of
16 specific pieces of equipment.

17 Now, in many cases, these pieces of equipment, of
18 course, are indispensable components of new processes.
19 Nevertheless, it is quite a shift in SEMATECH's overall
20 architecture. It's been associated with a greater reliance
21 by the consortium on research carried out within equipment
22 and member firms. Rather than being carried out within the
23 central research facility, the central fabrication facility
24 of SEMATECH in Austin, Texas, you are now seeing a greater
25 focus on characterization, development and standard setting

1 in the equipment area, and to a great extent, this new
2 agenda, I think, deals as much with supporting modification
3 and adoption of technology as it does with longer-term,
4 further-out, more fundamental research. So, you have seen a
5 shift, I think, along with the change from horizontal to
6 vertical collaboration, you have seen some moving in of the
7 time horizon of SEMATECH research certainly relative to the
8 time horizon that some of its original advocates suspected
9 or suggested that it would carry out.

10 Let me make some comments about some factors that
11 have contributed to SEMATECH's success, but I don't want to
12 go into those in much detail. Let me talk briefly about
13 whether SEMATECH is a success, to state it crudely, far too
14 crudely, and I think this raises some interesting issues,
15 again, because one of SEMATECH's -- one of the factors that
16 probably has contributed to SEMATECH's viability has been
17 the ability of this consortium to shift its goals, to shift
18 its agenda, and that very flexibility which is associated, I
19 think, with the heavy involvement of industry and its
20 management and financing and staffing, that very flexibility
21 makes it difficult to evaluate SEMATECH, particularly from
22 the point of view of public policy, because the -- if you
23 will, the original set of goals to which SEMATECH committed
24 itself now have been changed and revised in significant
25 ways.

1 And the question then is, what sorts of standards
2 of accountability do we employ, do we apply to this kind of
3 a consortium? I think we -- on the one hand, one wants to
4 be able to hold users of public funds to certain goals or
5 commitments. On the other hand, flexibility is clearly
6 indispensable, I think, to the success of consortia of the
7 SEMATECH variety, and therefore, one really faces a bit of a
8 trade-off or a dilemma here.

9 The revival that -- through the -- the indicators
10 of competitiveness and their association with SEMATECH's
11 operation and SEMATECH's results, I think this -- this is a
12 -- this causal relationship I think is very difficult to
13 sustain on the basis of the available data, and, indeed,
14 even Bill Spencer, the CEO of SEMATECH, may have contributed
15 as much to the Dallas Cowboys winning the Superbowl as it
16 did to the revival of the semiconductor industry. That is
17 to say, we see a relationship here. That is not to say that
18 there is a strong causal link in the manufacture of
19 equipment and manufacturing terms in the global equipment
20 and SEMATECH's establishment.

21 SEMATECH's organization has coincided with a
22 significant shift in the markets in which semiconductor
23 firms have chosen to compete, withdrawal of a number of
24 firms from the dynamic random access memory market and a
25 substantial expansion in the market for logic devices has

1 shifted substantially market share and revenues associated
2 with the presence of U.S. firms, and the recession in the
3 Japanese semiconductor manufacturing industry, combined with
4 entry by South Korean and Taiwanese firms in particular
5 into the manufacturing industry, has provided new markets
6 for U.S. equipment firms that have contributed, I think, to
7 their revival.

8 So, it's difficult to see direct evidence of bits
9 of technology developed by SEMATECH getting into practice
10 within semiconductor manufacturing and themselves
11 significantly transforming the performance of these firms,
12 and therefore, these causal relationships, I think, are very
13 difficult to pin down, and, indeed, this is true of most R&D
14 collaboration. Most R&D projects -- tracing their results
15 and attributing outcomes to R&D investments in less than
16 seven, perhaps as much as ten years, is an extremely
17 difficult and frequently unsustainable intellectual
18 exercise. And so you have, again, a conflict between the
19 time horizon imposed in many cases by policy and other
20 concerns on evaluating something like SEMATECH and the real
21 time horizon over which the results of R&D collaboration,
22 all forms of R&D, flow into competitive outcomes. And
23 again, this is not unique to SEMATECH. You can see the same
24 things operating in other federally funded and state funded
25 R&D programs.

1 Nevertheless, I think if you look at where
2 SEMATECH has tended to be less successful in its
3 relationships with equipment firms, it has been in many
4 cases where equipment firms suffered from non-technological
5 as much as technological weaknesses, and here the area of
6 photolithographic stepper equipment, I think, illustrates
7 the inability of SEMATECH through support for technology
8 development alone to overcome competitive problems that
9 reflected in many -- in the case of a particular firm, GCA,
10 a history of management, quality and product support
11 failings that in the end prevented GCA from being more
12 successful with a technologically effective -- technological
13 in the narrow sense -- technologically effective new pieces
14 of equipment whose development had been supported by
15 SEMATECH.

16 And the GCA episode, I think, raises a more
17 general challenge that SEMATECH faces and a challenge that I
18 think, again, is not unique to SEMATECH but is likely to
19 appear in other consortia of this vertical variety, which is
20 the problem of collaboration with a group of small firms in
21 a relatively fragmented capital goods industry like the
22 semiconductor manufacturing equipment industry. Not all but
23 many or most of the U.S. semiconductor equipment firms are
24 much smaller than the manufacturers. They have simply much
25 smaller pools of financial and managerial and in many cases

1 technical resources to devote to collaboration with
2 equipment manufacturers, and therefore, in many cases, their
3 problems are not solely technological but are managerial or
4 financial, and where they are collaborating in technological
5 projects with the firms in -- the manufacturing firms in
6 SEMATECH, these equipment firms have a very tough time
7 absorbing and applying -- getting back to the transfer
8 problem -- absorbing and applying the results of
9 SEMATECH-funded research. And in many cases, they simply
10 need much more than technology. Technology alone is
11 insufficient to turn them around or to resolve any of their
12 problems.

13 Now, I think the other interesting issue in the
14 vertical collaboration is how the benefits of collaboration
15 are captured by the member firms of SEMATECH. SEMATECH has
16 changed its policies toward the dissemination and the
17 treatment of the results of its research and their
18 disclosure to non-members and the like since its foundation,
19 and at present, equipment firms basically -- equipment firms
20 who have participated in development or improvement projects
21 with SEMATECH are free to embody the results of those
22 projects in equipment that they sell to any and all comers,
23 basically, with some right of first refusal for SEMATECH
24 member firms in purchasing that equipment.

25 Now, the results of this, of course, are that for

1 member firms, capturing returns are more difficult,
2 arguably, particularly for the firms, the member firms
3 within SEMATECH who are not investing substantially in
4 purchases of new equipment. So, you see that there is some
5 division of interest or differential ability to capture some
6 of the benefits of SEMATECH between the firms who are
7 investing aggressively in capacity expansion, which implies
8 equipment purchase and the rapid incorporation of new
9 generations of equipment, and those firms who are perhaps in
10 more mature segments of the semiconductor industry who are
11 not similarly engaged in substantial capacity expansion.
12 So, the capture of the results or the appropriability of the
13 results of semiconductor research, I think, is a very
14 interesting issue. It's an issue, again, that is more
15 complex in a vertical collaboration of this sort than is
16 often the case in horizontal collaborations.

17 What are some lessons of SEMATECH, and I will try
18 to wrap up here. I think that industry-led consortia of the
19 SEMATECH variety, consortia that are entirely or
20 substantially financed by industry based on the experience
21 of SEMATECH and other consortia, particularly in the U.S.,
22 generally focus on nearer rather than longer-term research.
23 Despite some of the promotion of consortia as an answer to
24 under-investment in fundamental Blue Sky research, I think
25 that most evidence suggests that industry-led consortia are

1 likely to focus on near-term research, and I think SEMATECH
2 is consistent with that. And, indeed, much of this research
3 involves technology adoption rather than long-term research
4 activities.

5 A relatively autonomous, freestanding organization
6 with substantial industry control over management and
7 operating decisions, I think, again, is highly desirable
8 based on the SEMATECH experience, even where significant
9 public monies are involved. This type of organization
10 should involve industry in its management and, very
11 critically, in its staffing. The staffing of SEMATECH by
12 member firms, I think, is an extremely important component
13 of its success in transferring results to member firms.

14 The role of government funding in SEMATECH's
15 viability, I think, is a complicated issue, slightly more
16 complicated, perhaps, than a first glance would suggest. In
17 my view, federal funding, commitment of federal funds and
18 particularly the multi-year commitment of federal funds was
19 an important signal to the industry of SEMATECH's likely
20 establishment and near-term viability, but I think SEMATECH
21 suggests that its permanence is not essential to the
22 survival and to the viability of the consortium.

23 The exclusion of non-U.S. firms from SEMATECH I
24 think has had a very limited effect on the cross-border flow
25 of research results and perhaps the cross-border flow of the

1 benefits of SEMATECH research, both because of its focus on
2 working with equipment firms who are certainly in a position
3 to sell equipment to non-U.S. firms and also because many of
4 the member firms involved in SEMATECH have various
5 collaborative agreements and alliances with non-U.S. firms.

6 Finally, I think that the SEMATECH story and
7 particularly the experience with specific equipment firms
8 suggests that consortia can certainly assist and can make a
9 contribution to the revival or the sustenance of industries
10 with significant technological strengths, but consortia in
11 general and consortia in their effects on specific firms are
12 not likely to be able to substitute for the absence of
13 non-technological strength. That is to say, technology
14 alone in many cases is not sufficient to overcome the
15 effects of management, financial and other problems in
16 competitiveness.

17 Thank you.

18 COMMISSIONER VARNEY: Thank you very much,
19 Professor. That was an extremely interesting presentation.

20 Do my colleagues have any questions?

21 CHAIRMAN PITOFISKY: Yes, I would wonder if you
22 would talk a little more about this question of adapting the
23 research agenda. As you probably know, it's been suggested
24 that if antitrust weren't in the way, at least with respect
25 to research consortia that don't dominate a market, those

1 firms would get into production and marketing and the flow
2 of information downstream from research production,
3 marketing and upstream would help these groups be more
4 efficient, but here we see that SEMATECH to some extent did
5 adjust its agenda. I'd be curious as to how they did it.

6 I mean, did they put it to a vote, did they
7 delegate to a particular scientist the decision as to
8 adjusting the research agenda? I also see in your outline
9 that three firms pulled out as a result of that. What was
10 that all about? How efficient was the process that led them
11 to adjust their agenda to look at issues that as time went
12 on became more relevant?

13 PROFESSOR MOWERY: I don't think I would describe
14 it as -- the process as efficient necessarily, although -- I
15 mean, I think the results to some extent speak for
16 themselves. Among other things, one can argue that the
17 investment of SEMATECH in a substantial facility in Austin,
18 perhaps, was -- unnecessary may be an overstatement, but
19 excessive given the extent of the utilization of it. The
20 physical capital investment by SEMATECH in this facility to
21 some extent reflected the earlier focus on a joint process
22 development research agenda, and I think the equipment
23 development focus, although it does still utilize that
24 facility to some extent, has shifted the agenda to some
25 extent away.

1 How was the shift in agenda done? My
2 understanding, and again, I am speaking as someone who was
3 not there and I am speaking as someone who has talked to
4 some but by no means all of the principals, is that it
5 resulted essentially from an inability to move forward with
6 the joint process development agenda because of conflicts
7 among members and that the decision to shift was also
8 associated with the success of Robert Noist, the founding
9 CEO of SEMATECH, by Bill Spencer. So, there were a number
10 of changes that occurred simultaneously because of the
11 untimely death of Dr. Noist, but my understanding of the
12 shift was it was more or less undertaken by consensus rather
13 than through a formal vote.

14 The decision of three firms, Micron Technology,
15 Harris Semiconductor and LSI Logic, to depart from SEMATECH
16 I think reflected to some extent their position -- and
17 keeping in mind this is more than five years ago -- their
18 position as relatively weak players in the process
19 technology. They in some respects saw this joint
20 development of a state-of-the-art process that would be
21 stimulated among firms as a way to upgrade their technology.
22 When SEMATECH shifted away from this sort of process
23 development focus, they felt that they stood less to gain
24 and elected to depart.

25 Now, I think there are still a couple of firms, at

1 least one firm in particular, AT&T's semiconductor operation
2 has suggested that it may still -- it is reviewing its
3 continued participation in SEMATECH, and to some extent, I
4 think that reflects the fact that you still have some firms
5 within SEMATECH who because of their competitive
6 positioning, because of their commitment to their own
7 semiconductor manufacturing operations, and perhaps because
8 of the ways in which they have managed their relationships
9 with SEMATECH, are not benefiting as much as other member
10 firms, and therefore, AT&T, for example, at least has
11 signaled its decision to enter an agonizing re-appraisal of
12 its involvement, if not to formally withdraw, and there
13 certainly is the possibility that one or two other firms
14 could withdraw.

15 And, you know, the future of SEMATECH, I think, is
16 going to be very interesting to see, because with a
17 combination of different mechanisms for appropriating the
18 results than those originally envisioned, the cessation of
19 federal funding and the continued, if you will,
20 differentiation among the member firms in terms of their
21 position within the industry, I think you -- at least the
22 possibility exists that you will have a smaller number of
23 U.S. members in SEMATECH, say, in five or even ten years,
24 and conceivably even non-U.S. firms as members in a decade's
25 time.

1 CHAIRMAN PITOFSKY: Thank you.

2 COMMISSIONER VARNEY: Okay, I have one question on
3 the first part of your talk, on the link between the -- the
4 tight link between the process and the product. As you
5 know, we have had the opportunity in the last year to look
6 at six or so transactions where we were either alleged to
7 have been dabbling in innovation markets or admittedly
8 dabbling in innovation markets, and they were never
9 divorced from the existing product market. On occasion, our
10 remedy has been that the parties have agreed to license the
11 process, sometimes with a divestiture of the facility and
12 sometimes not. Am I to take from what you said this morning
13 that we ought to act with exceeding caution when we reach a
14 consent where we license the process but do not require
15 divestiture of the facility?

16 PROFESSOR MOWERY: When you say divestiture of the
17 facility, you are talking about divestiture of the
18 manufacturing part?

19 COMMISSIONER VARNEY: Manufacturing, yes.

20 PROFESSOR MOWERY: I think that probably -- it
21 seems to me that, again, speaking as a non-expert on the
22 evolving concept of innovation markets, I think that the --
23 the feasibility of -- at least in this industry, the
24 feasibility of licensure of the process technology without
25 substantial requirements, for example, or mandates to

1 transfer the know-how and probably transfer more than just
2 that, the effects of licensing the process technology alone,
3 it seems to me, can be quite limited. And again, this
4 reflects the relatively unique circumstances of this
5 industry.

6 You know, the chemicals industry, which in some
7 respects resembles semiconductors, is an industry with a
8 substantial history of licensure of process technology, and
9 I think the reasons for those differences are interesting,
10 but I can't get into them. At the same time, the -- the
11 divestiture of the manufacturing facility within which that
12 process is being carried out may or may not be relevant to
13 the licensability of the process technology, because the
14 process in that manufacturing facility is going to be
15 extremely idiosyncratic and unique to that manufacturing
16 facility, and in many cases it is not going to be fully
17 characterized, depending on the maturity of the process, for
18 even that manufacturing facility. The development facility
19 in many cases is the strategic asset with respect to the
20 process.

21 COMMISSIONER STAREK: I'd like to ask a question
22 and learn a little more about how intellectual property
23 works in this industry. I had a sense from your remarks
24 that with regard to SEMATECH, that there doesn't seem to be
25 patents put into place, because if I understood you

1 correctly, it looks like the technology is available to all
2 of the participants in SEMATECH. If that's the case -- and
3 I'm not sure it is, I just want to learn a little bit more
4 about how it works -- how does SEMATECH then participate in
5 the industry with, say, the three firms that withdrew? Are
6 they competing with SEMATECH? You know, are patents being
7 put into place here that would restrict SEMATECH
8 participants from participating in the markets?

9 PROFESSOR MOWERY: Well, Mr. Donaldson can
10 probably speak to this with equal authority. My
11 understanding is that the -- is that all of the member firms
12 in SEMATECH have access to the intellectual property, that
13 the -- there was originally a -- what, a two-year window
14 prior to licensure of non-member firms, but that that has
15 been substantially relaxed, and, therefore, the three firms,
16 for example, who have withdrawn have access in my
17 understanding to the formal bits of intellectual property
18 created within SEMATECH, keeping in mind that in many cases
19 the -- what's interesting about the intellectual property is
20 its embodiment in pieces of equipment and in other cases
21 what's interesting about the intellectual property is its
22 non-embodied form and the know-how component thereof, access
23 to which can be gained most effectively by having your
24 people on site, either in Austin, Texas or on the site of a
25 specific development project.

1 COMMISSIONER STAREK: Thank you.

2 MS. DESANTI: I have a couple of questions. You
3 mentioned an increased focus on standard-setting, and I was
4 wondering if you could explain a little bit more about the
5 role of standard-setting in this industry and how standards
6 are evolving.

7 PROFESSOR MOWERY: I can say a little bit about
8 SEMATECH's -- what I mean by the reference to standard
9 setting.

10 What a number of the projects in the equipment
11 area within SEMATECH have tried to do is essentially
12 establish performance benchmarks and performance
13 characteristics or performance standards associated with new
14 pieces of equipment that would allow member firms to
15 understand or to predict, really, more intelligently what
16 happens when I change this recipe over here to the
17 performance of this piece of equipment. So, it's very much
18 -- these are by and large functional and performance
19 standards that are specific to individual pieces of
20 equipment or in some cases clusters of equipment.

21 Now, it's also the case that a number of the
22 participant firms within SEMATECH view these standards as,
23 at best, partial and insist on substantial additional custom
24 tweaking of pieces of equipment once those pieces of
25 equipment are bolted down on the shop floor of their

1 production fab. But nevertheless, the standard setting I'm
2 referring to here is purely sort of informational, saying
3 that cause here will produce effect here based upon our
4 characterization of this piece of equipment.

5 MS. DESANTI: And the extent to which firm
6 variability continues is some reflection of the difficulty
7 of that process without the additional tweaking? Is that an
8 accurate --

9 PROFESSOR MOWERY: I think it's a reflection of --
10 I mean, the other thing to keep in mind and the point I
11 meant to emphasize and neglected to is the semiconductor
12 industry is not a homogenous beast. It is an industry
13 comprising product segments that obviously can be
14 disaggregated very finely. Nevertheless, at a fairly high
15 level of aggregation, different product segments are quite
16 different in their commercial characteristics and even to
17 some extent in the process technology requirements. The
18 various members of SEMATECH are participating in different
19 markets and their product mixes among these categories
20 varies substantially. So, their demands for a given piece of
21 equipment are likely to differ significantly.

22 At the same time, the very uncertainty and the
23 very complexity that characterizes this process also means
24 that different firms have different approaches, that they
25 have their own trial and error-developed recipes and

1 techniques for maximizing the performance of specific pieces
2 of equipment. So, both of these influences mean that
3 standards are, at best, partial. They, at best, convey some
4 but by no means all of the necessary information to take
5 this piece of equipment and put it in your garage and start
6 making random access memory chips.

7 MS. DESANTI: And I had a question to follow up on
8 the first part of your testimony, as well. One of the
9 issues that comes before the Commission from time to time
10 are issues relating to justification for a merger, that the
11 parties need to combine in order to maintain their volume
12 and increase the rate of going down the learning curve as a
13 result. I was interested in your testimony that in this
14 industry, at least, engineering hours are also a component
15 of that.

16 Do you have a sense of the relative importance of
17 volume versus engineering hours, or is that too difficult a
18 mix to parse?

19 PROFESSOR MOWERY: It varies, I think, among
20 different product segments, and again, we -- what our
21 results really pertain most specifically to is the -- the
22 first, say, 24-plus months of operation of a new process
23 where we do find, as I recall, we find that the contribution
24 of engineering hours are roughly comparable to cumulative
25 volume in improving performance. Whether that applies to a

1 process that's in operation after ten years in that industry
2 I think is something we can't speak to. What we can speak
3 to is the early stages of operation, and there we seem to
4 find that the engineering hours are as important but not
5 necessarily more important than cumulative volume.

6 COMMISSIONER VARNEY: Debra?

7 MS. VALENTINE: Actually, I had something of the
8 same question, and that is whether the exogenous factor,
9 like the application of the engineering hours in terms of
10 its importance to benefiting from the learning curve, is
11 something that's unique to semiconductors or is something
12 that you might often find in other industries, just in
13 helping us to evaluate efficiency claims that people make in
14 mergers.

15 PROFESSOR MOWERY: I think it's -- my sense is
16 that, for reasons I alluded to, that semiconductors are
17 probably an extreme case because of the fact that you are,
18 to a great extent, continuing to develop a new process once
19 it's in your volume manufacturing facility. That is to say,
20 the process when you get it from your good friends or
21 enemies, as the case may be, in the development facility
22 within your firm is, at best, partially characterized. You
23 cannot fully duplicate the conditions in a volume
24 manufacturing establishment within a development fab, for
25 example.

1 So, to a greater extent in semiconductors than,
2 perhaps, in automobiles or in -- perhaps even in steel, you
3 are continuing to -- you still have to run experiments, you
4 still have a lot of very complex technical questions to
5 answer when you receive in the manufacturing facility a new
6 process. So, I would guess that semiconductors are very
7 much an extreme case but perhaps not -- they are different
8 in degree but not in kind.

9 MS. VALENTINE: Actually, knowing what you know
10 about the semiconductor industry, how would you counsel them
11 if they wanted to form joint ventures to capture
12 efficiencies to improve their competitiveness? Would you
13 recommend smaller consortia so there would be less fear of
14 sharing proprietary information? Would you recommend
15 horizontal as opposed to vertical collaboration so there
16 wouldn't be discrepancies in capturing results? What would
17 you do?

18 PROFESSOR MOWERY: Well, I think -- I think that
19 -- you know, I think that it -- the process technology
20 remains -- I mean, I have always -- it has always seemed to
21 me that the process technology in this industry remains very
22 much among the crown jewels, because of its specificity to
23 different firms and because of the problems of its transfer
24 among firms and the like. So, I think that, you know, what
25 is striking to me about SEMATECH is the viability of the

1 vertical collaboration.

2 Now, there are, I think, significant problems and
3 difficulties within these vertical collaborations.
4 Nevertheless, those seem to have as much if not more
5 potential to exploit some of the information sharing and to
6 exploit areas where firms are willing to share information
7 as the horizontal ones. And again, keeping in mind, again,
8 that semiconductors are probably more nearly unique, but
9 there are -- the generic elements of the process technology
10 among manufacturers perhaps is a bit smaller than all of us
11 thought in many respects when SEMATECH's foundation was
12 envisioned. And I think that has some implications.

13 Again, whether one can generalize from the
14 semiconductor to other industries I think is just wide open.
15 I don't know. I mean, you can see some of this vertical
16 collaboration going on, for example, in the machine tool
17 industry with the National Center for Manufacturing
18 Sciences, but that is a very different beast in many
19 respects.

20 COMMISSIONER VARNEY: Thank you very much,
21 Professor.

22 If you are ready, Mr. Donaldson, we will turn to
23 you. Richard Donaldson is senior vice president and general
24 patent counsel for Texas Instruments. He has been with
25 Texas Instruments for the past 25 years, with direct

1 responsibility for patent and technology licensing since
2 1973.

3 Mr. Donaldson has an LLM in trade regulation from
4 George Washington University and a JD from St. Louis
5 University, and thank you very much for joining us this
6 morning.

7 MR. DONALDSON: Thank you very much. I really
8 appreciate the opportunity to make comment here. I am sure
9 that I am going to take a less scholarly approach than
10 Professor Mowery has taken, and probably because of the
11 experience I have had, I am going to focus a lot more on the
12 practical aspects of the semiconductors industry and really
13 focus on the real issue of intellectual property.

14 I think that the semiconductors industry is a very
15 dynamic industry, and I think, as has already been explained
16 this morning, it is really characterized by very rapid
17 growth and infusion of new technology, and I think a key to
18 that is the role that innovation plays. I think innovation
19 is really the key to competition, and as a corollary to
20 that, I think intellectual property protection is a key to
21 innovation. So, my concern and a lot of the concerns I
22 think of the semiconductor industry is how or what effects
23 will antitrust application have on this industry.

24 Part of that is because, at least from my
25 perspective, a lot of the policy of antitrust has been based

1 upon price competition in mature markets. I think there are
2 some different characteristics when you get to a very rapid
3 growing technology market, and part of that, something that
4 we see in the SC industry, is that there is a premium that's
5 placed on product differentiation. There is a premium
6 placed on being in the market on time. The narrow time
7 window really poses some very difficult problems. Part of
8 it is just because of the very high cost that's associated
9 with this rapid infusion of new technology.

10 It's typical that we spend over 10 percent of
11 revenues on R&D, and capital costs just continue to escalate
12 to build new factories, because factories just continually
13 become obsolete, and one of the projections that's been made
14 is over the next five years, over \$120 billion will be spent
15 for new manufacturing facilities around the world. And I
16 guess another comparison, just to show the escalating costs,
17 in 1990, we looked at the cost of building a new factory to
18 manufacture the semiconductor chips, and it was \$400
19 million. Today that's over a billion dollars, and in the
20 next ten years the projected goal will be \$2 billion. So,
21 these are tremendous investments that you have to make, and
22 to I guess exacerbate the problem a little bit more, and is
23 something that Professor Mowery pointed out, is the
24 uncertainty, a lot of the uncertainty in developing a new
25 technology.

1 If you make a mistake, if you make a design error
2 of some sort, you have such a narrow time window, you may
3 miss out on a whole generation of product. The fact that
4 you are successful in this generation doesn't mean that you
5 necessarily will be a major contributor in the next
6 generation of a product, and the investment that you have
7 made really puts a lot of pressure, and I think it raises a
8 lot of intellectual property and licensing issues that I do
9 want to address somewhat.

10 And I guess another characteristic of the industry
11 that affects the uncertainty and unpredictability is the
12 overlapping technology that we have in the industry. The
13 innovations and the technology overlaps not just from
14 product to product but from company to company, also, and
15 it's common that when you make an improvement, you come out
16 with the next generation of products, it will build on
17 technology that's already in place. So, you may have a
18 present technology that dominates in subsequent generations,
19 and it is not just you who's developing. It is a whole
20 number of people who are participating in this industry.
21 So, that adds a great deal of uncertainty.

22 In looking at it -- and what that really says, and
23 one of the points I think that is probably not unique to the
24 industry but certainly is an important aspect of it, is
25 there is a requirement for access to technology of other

1 companies in the industry. You cannot have just a product
2 without using some of the developments in other areas. If
3 you cannot offer the new innovations, the new features that
4 come out on the products, you will not be able to compete in
5 that industry. So, how do you get that access and what are
6 the restrictions going to be in getting that access, and
7 that's where intellectual property, I think, really plays a
8 very significant role.

9 The fact that the companies have to make such a
10 huge investment in -- in both research and development and
11 in capital facilities makes it essential that you can get a
12 good return on that technology investment, and you have to
13 also weigh the risk that you might not be successful from
14 one generation to the next. And there is really two ways
15 that you can get the return on this investment. One is by
16 making and selling the product, which is a time-honored way,
17 nothing wrong with that, and the other way is to get some
18 value for intellectual property, and that's what I would
19 really like to focus on, because I think that probably has
20 the most relevance to the topic of antitrust enforcement.

21 The value for intellectual property, it has a
22 number of very clear values. One, it can protect you from
23 imitators. You have made this tremendous investment in
24 technology. Because of the characteristics and the nature
25 of the industry, it is very easy for other people to copy --

1 maybe that's too strong of a word -- but to at least come
2 out with a competing product very, very rapidly.
3 Intellectual property can help you guard against that or at
4 least get a return if they do use your intellectual
5 property, and the other is to raise capital, whether you are
6 going to make the investment yourself, whether you want to
7 license it to someone else to invest in it. If you can
8 protect your innovation, then that makes it much easier to
9 raise capital, and I can give some specific examples of
10 things that at least Texas Instruments has experienced in
11 the ability to or the effect of intellectual property in
12 raising capital.

13 From the licensing perspective, there are a number
14 of ways that you can get -- or maybe I should say more
15 generally from an enforcement perspective, there are a
16 number of ways that you can get value for intellectual
17 property. One way is just to keep the technology to
18 yourself and do what patents permit you to do and be the
19 exclusive manufacturer. There are a lot of risks involved
20 in that, and it is very difficult to do, and most companies
21 in this industry do not do that, and one of the reasons that
22 is is because there is so much parallel technology being
23 developed that you need to build on and utilize. You really
24 need access to other people's processes, circuits. So.
25 It's hard to keep an area exclusively to yourself.

1 So, most people do engage in the licensing of
2 technology, and there are really two I think major
3 advantages that we get from this. One, and I am going to
4 talk more about this, the access to someone else's
5 technology, and the second is royalty income. I think that
6 the royalty income can really -- is very important in --
7 because it -- if you have made the technology investment and
8 if you are licensing and do obtain royalty income, this has
9 a very direct bearing on the decisions you make for research
10 and development. I know in our case, in the case of TI,
11 during some recent periods of time when the market was not
12 as strong as it is now, we were able to maintain higher
13 levels of R&D because we had royalty income. Had we not had
14 that, we would have had to cut back on R&D. It has a very
15 direct effect, and R&D is just so critical to this
16 industry, we need to maintain that high level.

17 Another way to get value for intellectual property
18 is in what I have been calling alliances, and this is a
19 situation where you would license not only, for example,
20 patents but probably would also include a license under
21 know-how. As Professor Mowery pointed out, this is
22 something that -- almost like the crown jewels, for many of
23 the companies, the specific way that you manufacture a
24 product, but because of a lot of other reasons, you may
25 selectively need to enter into alliances with other

1 companies, and in many cases, you will as part of the value
2 that you contribute, you will include the know-how of how to
3 use a process.

4 There is -- you can have either a manufacturing
5 type of joint venture or alliance or you can have joint
6 research, and we have been involved in both types of
7 alliances, and, you know, the advantages are probably pretty
8 obvious. In a manufacturing joint venture, it's a good way
9 to get -- to reduce the cost of capital. If you have
10 developed a process with your research and development, part
11 of your contribution if not all of your contribution to a
12 joint venture might be your technology, where a partner may
13 contribute dollars or yen or -- wherever you are, to help
14 build the factory, and this has proved to be a very
15 effective way of being able to add manufacturing facilities
16 and share some of the risks that are involved.

17 You also can obtain access to technology into
18 different markets by entering into selected alliances with
19 other people. Sometimes it's in a vertical arrangement,
20 where you enter into an alliance with an -- we would enter
21 an alliance an equipment manufacture, and sometimes they are
22 horizontal, with a direct competitor, basically, like how
23 would you develop the next version of a random access
24 memory. The development costs are extremely expensive, and
25 one of the advantages it gives, you could have two

1 complimentary designs that you both pursue, and you guard
2 against failure. If one of the designs doesn't work, there
3 is a fall-back position. You limit it to an area, but it
4 does provide a sharing of risk, and it can guard against you
5 missing out on a whole generation of product, and those are
6 becoming much more common in the electronics industry and
7 the semiconductor industry.

8 When you enter these different kinds of license
9 arrangements, however, it's necessary to have what we would
10 call in a way reasonable restrictions under licensing. You
11 need to -- some of this technology is the very heart of the
12 company, and you need to have ways to protect it, and when
13 you look at some of the issues that are being raised from an
14 antitrust perspective, it raises -- there are some areas
15 that -- that are of interest, are of concern, perhaps.

16 Typically, when we would enter into licensing
17 arrangements, we would talk about maybe a field of use or a
18 cross-license. They are called different things, portfolio
19 license, field of use, cross-license, where we would give
20 someone else the right to use all of our patents in a
21 certain technology and get back in return the right to use
22 their patents. This is bringing back, and I guess that the
23 license is something I think that's really essential to the
24 industry, because it gives rapid access to technology
25 developments. Since there is this huge overlap of

1 technology and products, you need to be able to incorporate
2 and use new features and new developments that other people
3 in the industry cannot, that they come up with.

4 You need to have the certainty that if you make
5 this investment in a \$1 billion fab, that someone is not
6 going to come up with a patent and say oh, by the way, you
7 can't build this product, I have a patent. You need to get
8 -- if you are going to make that kind of investment, you
9 need that kind of assurance, that you will have license
10 rights. There are some arguments -- I know there are
11 arguments from an antitrust or issues from an antitrust
12 perspective of those kind of agreements, but from a
13 practical point of view, that is really critical to the
14 semiconductor industry.

15 I think quite a bit has been said about
16 cross-license arrangements. I am not going to -- I
17 mentioned some of the stuff in the outline that I had
18 prepared. I am not going to really go into a lot of detail.
19 I think most people are familiar with what a cross-license
20 is, and if you have any questions, I would be glad to answer
21 them later on.

22 I guess one aspect that I want to perhaps clarify,
23 when we enter into cross-license arrangements, which is the
24 typical licensing arrangement in the industry, there is
25 typically what's called a balancing payment, and there is a

1 couple of aspects of that. It levels the playing field. It
2 takes into account technology developments that both parties
3 have made. It prevents people who have not made a
4 technology investment from just getting a free ride and a
5 competitive advantage, but I guess the conflicting question
6 is, is this a barrier to entry of new people?

7 I think it's very clearly -- history has shown it
8 has not been a barrier, in particular a small company who
9 has some innovation may have very significant leverage over
10 a larger company and may be able to get a very advantageous
11 license arrangement because of that. The larger company may
12 need -- maybe it's just one patent, but he will need that
13 patent, and it is very easy for a small company to come up
14 with that kind of an innovation and to gain entry. It is
15 also easy and there is a lot of examples of larger companies
16 who have only money who want to get into the industry. They
17 want -- they don't have the technology, so when they get a
18 cross-license, they wind up paying royalties, but the
19 experience has been that that has not been a detriment to
20 them. We have examples like Samsung, which is now the
21 world's largest DRAM manufacturer, who was just in that
22 position. They were paying royalties, but they are also
23 very successful.

24 The balancing payment -- and I guess another thing
25 I would like to clarify a little bit, because there has been

1 some concerns, that maybe the large companies just get
2 together and have a royalty-free license, cross-license, and
3 it makes it more difficult compared to a small company. If
4 the two companies have patent portfolios that are fairly
5 close, the amount of money that's transferred may be pretty
6 small, but the amount of value that is transferred can be
7 extremely large, and that's just something that I think
8 everyone needs to keep in mind.

9 I guess when you look at taking the
10 characteristics of the industry into account, what will the
11 role of antitrust enforcement be in the future? And I think
12 it's the uncertainty that is of most concern to us anyway.
13 You talk about innovation markets, how will that be applied?
14 You talk about the -- what we have, the cross-license
15 situations, are they going to be viewed more -- are they
16 horizontal agreements between competitors? Are they going
17 to be looked at more along the lines of like a merger would
18 be?

19 The cross-licenses, are they going to be compared
20 to some type of patent pooling, in effect, where those have
21 been looked on with suspicion at times, but they are a way
22 of life in the semiconductor industry. They are a
23 necessity. This is a situation where quick access to
24 technology I think clearly far outweighs any perceived risk
25 of collusion.

1 This is such a competitive industry, there are so
2 many players in it, it is hard for me anyway to imagine any
3 collusive effect between the people, because you are out
4 there competing and doing the research to get into that very
5 narrow time window, because that is going to be critical to
6 being able to support the next product.

7 And I guess another question is the -- that has
8 come up anyway is the essential facility, how a patent -- if
9 you have a relatively strong patent in an area, if you enter
10 into a cross-license agreement, will someone be able to
11 raise an antitrust question? Is this a -- for time, for
12 example, if you enter into a field of use, if other patents
13 are involved, if you are required -- if you have one of
14 these important patents and you are required under the
15 essential facility doctrine to license it to other people,
16 does that really help innovation or does that discourage
17 innovation?

18 I think these are questions that -- that aren't
19 resolved, but they are -- again, it goes back to the
20 uncertainty and perhaps a chilling effect that if more
21 defenses are going to be raised or different ways of looking
22 at licensing arrangements in the industry from an antitrust
23 perspective are going to be addressed, it is just the
24 uncertainty of are we going to be able to continue in a way
25 that we think is really necessary to be successful in the

1 industry?

2 That's the end of my remarks. Thank you.

3 COMMISSIONER VARNEY: Thank you. Let's open it up
4 to some questions.

5 Do you have any, Susan, any questions?

6 MS. DESANTI: All right, yes, I have a few
7 questions.

8 I hear the degree of concern that you have about
9 uncertainty relating to antitrust, and I'm wondering whether
10 you have any specific examples of times when because of
11 antitrust concerns a particular transaction has not gone
12 forward or a particular licensing arrangement has not gone
13 forward.

14 MR. DONALDSON: It's hard to point to a specific
15 example that didn't happen. I know when we consider -- it
16 is really difficult when we consider a licensing
17 arrangement, like a joint venture, particularly a technology
18 joint venture with another company, the hindering and the
19 concern is is this going to be challenged and what can go
20 wrong, and there are situations -- we are extremely
21 conservative, TI is, in entering into these kinds of
22 arrangements, because just the fear and the hassle of well,
23 if it is going to get challenged from an antitrust
24 perspective. So, there is a lot of situations that we just
25 -- I think that are discarded where we say well, there is

1 another way that we can do this, let's try not to go down
2 the joint venture path because of potential problems.

3 MS. DESANTI: And are you hearing from your
4 business people that they think that the joint venture path
5 necessarily would have been a better way to do it? We heard
6 some this morning about the potential problems with joint
7 ventures as well, that they are not automatically the
8 solution to everything.

9 MR. DONALDSON: And I think we are in a little bit
10 different type of arrangement than a SEMATECH type of
11 arrangement, but again, we have gotten over from ten years
12 ago when hurdles, I think, were higher, and we would not
13 have done some things ten years ago that we would probably
14 do now and feel comfortable with as part of a joint venture.
15 We have a joint venture with Hitachi as far as developing
16 the next generation of DRAM. We have manufacturing joint
17 ventures with -- well, we have some in Japan, we have some
18 in Singapore, where we put in the technology and the process
19 and other people put in capital and manufacture new
20 products.

21 We have found ways to do it that we are
22 comfortable with under antitrust provisions, and I guess our
23 concern would be if now someone starts taking a new look at
24 these situations and say well, these are horizontal
25 agreements and maybe you have gone too far, and maybe that's

1 what the industry shouldn't do. I think the semiconductor
2 industry has gone down that path. It's become a necessity.
3 The cost of development of the new -- the new generations
4 are just so huge, and if you make an error, if you don't get
5 to contribute, they can be disastrous. So, you have got to
6 be able to share the risk and the costs.

7 MS. DESANTI: Can I --

8 COMMISSIONER VARNEY: Susan, can I interject on
9 that last point you just made, because I may have misheard
10 you this morning. You say the cost of innovation is so huge
11 as to be overwhelming, but I thought you said earlier that
12 there were not a lot of barriers to entry because innovation
13 could be done cheaply. So, I'm not --

14 MR. DONALDSON: No, innovation can't be done
15 cheaply, a license can be obtained cheaply. Someone like --
16 let me use as an example Samsung. They had no basic
17 technology of how you build a DRAM, but they were able to
18 get a license and to hire the people who could build the
19 factory.

20 COMMISSIONER VARNEY: So, the innovation is not
21 inexpensive.

22 MR. DONALDSON: No, it is very expensive. The R&D
23 I think is on average 10 percent of costs in the industry --

24 COMMISSIONER VARNEY: So, wouldn't you argue that
25 there are barriers to entry?

1 MR. DONALDSON: I am not saying that there are no
2 barriers.

3 COMMISSIONER VARNEY: Effective barriers.

4 MR. DONALDSON: They are not effective barriers in
5 keeping people out.

6 COMMISSIONER VARNEY: Sorry, Susan, go ahead.

7 MS. DESANTI: I just want to make sure I
8 understand where you are coming from. I am not aware of
9 particular government challenges to joint ventures, R&D
10 joint ventures or licensing arrangements within the last 10
11 to 15 years. I think the general approach of antitrust to
12 these has been to -- to acknowledge the many co-competitive
13 benefits that can be generated in that way.

14 Are you telling me something different that you
15 know about antitrust that I don't know or are you saying if
16 anyone is thinking about expanding any of these doctrines,
17 be very careful, because there is a lot at stake here?

18 MR. DONALDSON: I think it's the latter, and when
19 you hear some of the comments being made about when are you
20 getting too large a return for a patent, for example, or
21 when may the return be more than what your investment has
22 been? I forget how -- I think some of the antitrust -- it
23 might have been Rich Gilbert, I forget the exact statement,
24 but it was just some caveats that we are going to treat this
25 like other property when we look at an antitrust

1 investigation, are we changing the ground rules, and I guess
2 that's the concern, and if it is a change and if it opens up
3 avenues for people to challenge, where some of the other
4 people in a licensing arrangement can challenge, it will
5 have a chilling effect, in a sense, if you now as a licensor
6 have to be worried about new challengers in some of these
7 things that had become pretty common in the industry.

8 MS. DESANTI: You are probably aware of the new
9 DOJ licensing guidelines for the licensing of intellectual
10 property.

11 MR. DONALDSON: Yes.

12 MS. DESANTI: Are there any provisions in those
13 guidelines that have been of specific concern to you that
14 you think don't reflect what I've described as a pretty
15 benign antitrust approach to these things over the past
16 couple of decades?

17 MR. DONALDSON: Well, only from the aspect of
18 uncertainty in how are innovation markets going to be
19 implemented and how is that going to affect us, particularly
20 in the semiconductor industry, when -- whether there is such
21 a large group of people who have the capability of doing the
22 research, whether they are actually doing a competing
23 product at the time or not. You have a process in place --
24 I mean, Intel, for example, primarily builds
25 microprocessors, but that process can be used to build

1 basically DRAMs or any other kind of license without major,
2 major changes. So, where do you stop looking and how do you
3 address what the innovation market really is?

4 COMMISSIONER VARNEY: Well, I think one thing you
5 should keep in mind is that so far that's exactly one of the
6 things that we are trying to look at in these hearings, but
7 so far we have not looked at an innovation market as
8 distinct from existing product markets, so carry that back
9 to the business people.

10 The second thing that I would just comment on on
11 the cross-licensing is it seems to me that we historically,
12 and this is going back to what Susan said, we encourage
13 cross-licensing so long as it is open and not a market
14 provision. We are very open to cross-licensing when it
15 comes to certain markets and especially R&D. So, I
16 understand you make business decisions based on a number of
17 factors, but I would not hold antitrust as a factor in a
18 straight and open cross-licensing agreement to be a
19 prohibitive or indeed a deciding factor, and, in fact, as
20 you know, you can come to us and DOJ and get pretransaction
21 approval or tentative approval.

22 MR. DONALDSON: Yes, we do that, and we want this
23 to continue.

24 COMMISSIONER VARNEY: I think that will continue.
25 You know, one of the things that, again, we are trying to

1 figure out is, is there a chilling effect of traditional
2 antitrust principles when applied to new high-tech,
3 high-information innovation markets. That's the side of the
4 coin that I'm as interested in as, indeed, the danger that
5 you point out, not to create a chilling effect, but what are
6 the current chilling effects?

7 MR. DONALDSON: Well, one of the things that comes
8 to my mind, and I alluded to it a little bit earlier, is how
9 will the essential facility doctrine be applied.

10 COMMISSIONER VARNEY: Well, let me -- I mean, I
11 definitely defer to my colleagues who have vastly more
12 experience than I do on that, but it seems to me that the
13 essential facilities doctrine is highly unlikely to come
14 into play unless we are talking about a merger to monopoly
15 transaction that's been instituted by parties outside. I
16 just have not, you know, since I have been here I have not
17 seen a serious attempt to construct an essential facilities
18 doctrine and apply it to transactions.

19 Susan, what --

20 MS. DESANTI: Well, yeah, I guess I -- in the
21 light of -- I don't think that there are any examples you
22 can give me in the past ten years of government-sponsored
23 attempts to apply the essential facility doctrine in a
24 licensing-type situation. I mean, I -- that's part of what
25 I'm asking is, you know, are you asking -- you are asking --

1 you are talking to us about don't expand it versus, you know
2 --

3 COMMISSIONER VARNEY: Right, I mean, I think I
4 hear you say licenses or patents are not essential
5 facilities and don't make us give them up when we are
6 entering into transactions.

7 MR. DONALDSON: Perhaps you can't point to a
8 government-initiated initiative. I can point to a
9 private-initiated initiative where that argument was made.

10 COMMISSIONER VARNEY: Which was?

11 MR. DONALDSON: A patent can be an essential
12 facility and if you incorporate that in a cross-license
13 agreement with other patents, that's tying.

14 MS. VALENTINE: Was this patent functioning as a
15 standard or something?

16 MR. DONALDSON: No, it was just a -- it was just a
17 broad patent. The argument was this was a broad patent that
18 people in that industry needed, and if you incorporated that
19 with a field of use license where other patents were
20 included, then the argument was that this is tied, and we
21 think it was a bad argument, and it never got -- it never
22 went through litigation, but if that gets expanded, if that
23 gets to be a standard, I think that does have and would have
24 a chilling effect.

25 COMMISSIONER VARNEY: I think it might be helpful

1 for us, if appropriate, if you could present that to us in a
2 hypothetical manner, if you could give us a little written
3 outline of this discussion and the arguments that were
4 raised, and we could take a look at it, and, you know, you
5 can do it in a hypothetical manner without disclosing any
6 confidential information, and I think that would be very
7 useful, but it is certainly not something that we have
8 talked about around here.

9 MR. DONALDSON: Well, the chilling effect that I
10 -- if there -- that I perceive can be there is even under
11 the new guidelines, I mean, if you look under certain areas
12 that are not yet resolved, and to the extent that -- and
13 there is a statement that you are going to look at
14 intellectual property just like any other kind of property,
15 to the extent that this opens up to other people saying
16 well, this is something that is going to have to be
17 approved, it's a challenge we can make, may not work, you
18 know, in a licensing or litigation environment. It is
19 something that you have to defend against.

20 If you now have any kind of -- if you try to
21 enforce a patent, if you have ten counts of an antitrust
22 violation, you know, essential facility or all these
23 different ones, you have to argue against each of those,
24 and it can be a very time-consuming and very expensive
25 proposition. And maybe we just need time to let this

1 solidify a little bit and say that there aren't new rules
2 here, that the ground rules haven't been changed, but that's
3 just a perception that I have, and you hear some of the
4 things I hear in, you know, sitting down and negotiating
5 with people, it will raise arguments of this nature. And
6 true, it's not, perhaps, precedent in the law right now or
7 -- like the essential facilities doctrine, but it is still
8 something that it has been addressed.

9 COMMISSIONER VARNEY: It seems to me we are
10 hearing sort of be careful where you do the expansion,
11 because clearly there are some areas of the current
12 antitrust law that I think everybody has urged us to look at
13 in a new light, particularly when it comes to the inability
14 of companies to do R&D without entering into joint ventures
15 that might be looked at suspiciously under some current
16 regimes, but on the other hand, you want us to go slowly
17 when it comes to the expansion of other doctrine that you
18 think may have a chilling effect.

19 I would like to get Professor Mowery into the
20 discussion, if I could, and ask your thoughts on this
21 relationship between intellectual property and antitrust
22 principles, expansion of R&D, essential facilities. What's
23 your take on what we have been hearing here?

24 PROFESSOR MOWERY: Ah, this is well outside my
25 bounds of expertise, I think. I -- I really -- I really am

1 not in a position to comment very intelligently on these
2 things not having been engaged in most of the -- in most of
3 the debates.

4 I think that there is no question that the -- that
5 the -- Mr. Donaldson's firm is a classic example of the
6 increasing value of intellectual property as traded in the
7 markets, but beyond that, I'm not an expert sufficiently to
8 comment on these specific doctrines.

9 COMMISSIONER STEIGER: I guess a related question
10 is what experience have you had in looking at the
11 semiconductor industry with how willing firms are to
12 contribute intellectual property to a consortia, under what
13 terms they do so, what restrictions they impose, those sorts
14 of issues.

15 PROFESSOR MOWERY: Well, I think that there -- my
16 understanding of the contributions of intellectual property,
17 again, to SEMATECH was that it was much more -- it was --
18 most of it was undertaken on a non -- that there were not
19 formal, contractual provisions that were firm-specific with
20 respect to their contributions to intellectual property.
21 The -- and I think you need to distinguish, it seems to me,
22 that I -- I think we need to recognize that there are, as
23 Mr. Donaldson said, there are fairly significant differences
24 in management, in objectives and in all aspects of
25 organization between a SEMATECH-style consortium and the

1 kinds of joint ventures that, for example, TI, Hitachi and
2 your operation in, I guess, Italy, as well --

3 MR. DONALDSON: Right.

4 PROFESSOR MOWERY: -- where the latter are much
5 more focused in most cases on very specific products, very
6 specific markets, in many cases development of a specific
7 product for a specific market, and the -- so that the
8 licensing and the IP issues in those are quite different and
9 even the criteria by which firms evaluate their entry into
10 them and their operation within them are very different from
11 what you see in a SEMATECH. A SEMATECH is much -- while it
12 is not basic research, it is also not focused on development
13 of a specific product for a specific market, and therefore,
14 many of the provisions with respect to intellectual property
15 are quite different.

16 That having been said, I think that what emerged
17 in the SEMATECH operation in its early days was a greater
18 concern over contributions by some of the members of their
19 intellectual property, partly because it was so difficult to
20 -- I mean, even had one been -- been trying to write a
21 contract for it, it's hard to write a complete contract when
22 you're sending your people into the consortium and they are
23 working with highly qualified engineers from your -- what in
24 some cases are your direct competitors.

25 So, there were sort of almost self-imposed,

1 non-formal restrictions on what they were willing to
2 contribute, which did vary among the participants, of
3 course. Some were more willing than others to contribute
4 substantial process technology, IBM, I believe, among them,
5 but there remain even today within the operations of
6 SEMATECH real self-imposed concerns over even discussions of
7 what projects I as a firm might be interested in. Saying
8 you're interested in something says something to the people
9 -- the R&D engineers seated elsewhere around the table. I
10 mean, this is at the level simply of saying this is a
11 strategic priority to us or revealing it through saying this
12 is an interesting project, but that's several steps removed
13 from formal transactions in intellectual property,
14 obviously.

15 COMMISSIONER VARNEY: Mr. Donaldson, what would
16 your -- if you were going to enter into a consortia, what
17 kind of restrictions would you want to apply?

18 MR. DONALDSON: Well, and SEMATECH is probably a
19 good example. I think many of the participants -- TI is a
20 participant in SEMATECH, and there is a great concern about
21 what happens with intellectual property, and we approached
22 it more like other formal standards in the industry where in
23 a network area, you need standards, interface standards and
24 this sort of thing. You control the projects that you
25 participate in, and you just acknowledge or understand that

1 in those areas, anything while your people are working at
2 SEMATECH that they work on, the intellectual property is
3 going to be shared and everyone will have access to it, and
4 you have just given up that bit of intellectual property,
5 but you're careful about what those areas are and what you
6 don't want to happen is some of your base technology and
7 some of your other areas to wind its way in there in a
8 royalty-free environment.

9 It's the same way if we had to approach an IEE
10 standard or some other product standard. I mean, they are
11 important. You need standardization, they permit
12 complementary products to be built, but you are giving up
13 intellectual property protection when you do that, and you
14 pay a price for that freedom, and that's something that a
15 high-technology company guards very delicately.

16 COMMISSIONER VARNEY: Go ahead, Susan.

17 MS. DESANTI: I just wanted to acknowledge for
18 you, you are absolutely right, there are definitely issues
19 that are not resolved in the intellectual property
20 guidelines. Essential facilities is one of them. So, I hear
21 you on that, and certainly looking at those guidelines is
22 not a complete road map. Those are factors to be looked at.
23 Part of this comes from the fact that antitrust is very
24 fact-specific, and unless you have all the facts in a
25 particular situation, it's very hard to make an assessment.

1 That's part of what makes it time-consuming, but it is also
2 part of what makes it careful. Broad rules could be
3 imposed, but they might be more stringent than anyone in
4 your industry would like to see, but I just wanted to also
5 say that certainly I think you've gotten your message across
6 very clearly this morning of caution and what's exactly at
7 stake.

8 MR. DONALDSON: Thank you.

9 COMMISSIONER VARNEY: Okay, thank you so much, and
10 we will reconvene this afternoon. Thanks.

11 (Whereupon, the Commission stood in recess from
12 11:10 a.m. to 1:30 p.m.)

13 COMMISSIONER VARNEY: I think Chairman Pitofsky is
14 going to be a little bit late, so we will go ahead and get
15 started.

16 Welcome back this afternoon to our continuing
17 discussion on innovation markets, are we for them or against
18 them. This afternoon we are fortunate to have three very
19 distinguished speakers, writers, practitioners on this
20 topic, and what I propose we do this afternoon is hear from
21 our three speakers first without questions, and then at the
22 end of that time, maybe see where we are, take a short
23 break, and then come back and engage in a round table which
24 we could all participate in, if that meets with everybody's
25 needs.

1 MS. VALENTINE: Fine.

2 COMMISSIONER VARNEY: I would like to start by
3 introducing Professor David Teece. He is a professor of
4 business administration at the Walter A. Haas School of
5 Business at the University of California, Berkeley.
6 Berkeley is well represented here today. Since 1982, he has
7 held the Mitsubishi Bank Chair in International Business and
8 Finance. Professor Teece is the director of the Institute of
9 Management, Innovation and Organization at Berkeley, and
10 between 1983 and 1994 served as the director for the
11 Berkeley's Center for Research in Management. He has
12 written numerous articles pertaining to innovation,
13 cooperation and antitrust policy and is co-editor and
14 co-founder of the journal Industrial and Corporate Change
15 published by Oxford University Press.

16 Thanks to Dr. Teece, the results of Sloan
17 Foundation studies were made available to the FTC for these
18 hearings, and we deeply appreciate your efforts in that
19 regard. We have already heard interesting and useful
20 presentations on a number of Sloan Foundation studies, and
21 we look forward to hearing additional presentations as these
22 hearings proceed.

23 Dr. Teece?

24 PROFESSOR TEECE: Thank you.

25 First of all, I want to congratulate the

1 Commissioner and the Commission for holding these hearings.
2 I think it is very timely, and the chance to rethink how to
3 take innovation into account when we look at competition
4 policy is, I think, an opportunity that we can't afford to
5 let go by.

6 So, let me just begin by pointing out that I do
7 think in a qualitative sense, setting aside the paradigms
8 and the measures, there is something qualitatively different
9 about the kind of competition that we are observing in many
10 but not all markets today. I think it's got something to do
11 with fundamental enabling technologies and biotechnology and
12 in particular with respect to the microprocessor, which is
13 really changing the competitive landscape, and it's making
14 competition in many industries much more vigorous, it is
15 changing the nature of competition because of installed base
16 effects, network externalities and things of that kind.

17 So, while you have these tremendous improvements
18 in enabling technologies which are overturning many
19 established industries, you have also got increasing
20 globalization of markets, not just in this country but
21 abroad, and brick by brick, as trade barriers come down, you
22 are looking at not just a global marketplace, but you are
23 looking at one where not only do goods travel more freely,
24 but ideas travel more freely, and entrepreneurial
25 opportunities get recognized and acted on by parties abroad

1 even though the markets may be elsewhere. So, there is
2 something qualitative that's different, and I think what's
3 happening is that the established positions of many
4 incumbent firms are being challenged, and I think this is an
5 opportunity for some established ideas to be challenged,
6 just as established industries are challenged out there in
7 the real world.

8 The way I would like to do that is to focus on
9 what I call industrial dynamics. I'm an industrial
10 organization economist, and I have to say that while I'm
11 delighted that industrial organization sort of plays an
12 increasingly significant role in antitrust and competition
13 policy, industrial organization as a field has typically
14 been rather static in its structure, and it has not in the
15 main brought forward and made mainstream the concept of
16 innovation. So, innovation has sort of been a topic out
17 here in left field, and the broad stream of research and
18 theorizing goes forward, and innovation is sort of treated
19 marginally in the textbook.

20 If you go look at my textbook, you may see -- a
21 good text book like Scherer may have a couple of chapters on
22 it, but it sort of to some extent stands alone and is not as
23 integrated as it might be into the mainstream of thinking.
24 And as a consequence, even though economics plays a much
25 greater role, it in some sense isn't quite the lens that we

1 need to look at this changing competitive landscape. The
2 lens that we use very often still focuses on homogeneous
3 goods industries and sort of treats technology like it can
4 be moved around with alacrity and the transfer quotient is
5 zero and so forth. So, despite the great contributions of
6 Chicago and other disciplines and other schools of thought
7 to antitrust, there is still something that's missing.

8 And if you think about what's different in this
9 sort of post-industrial world, I think you can understand
10 why. In a way, there are sort of standard variables that we
11 are used to dealing with that really come from the last
12 industrial revolution, things like scale economies. They
13 are still important but not the way they used to be.
14 Capital intensity, well, what's that mean in the software
15 industry? Not much. It still means a lot, increasingly so,
16 in semiconductors. Integration economies, advertising
17 intensity, I mean, you have got that set of variables that
18 we are all familiar with that really come from studying and
19 looking -- you know, studying a period of the first and
20 second industrial revolutions.

21 But today, as we try and understand what's going
22 on out there in the global marketplace, we have to
23 understand things like technological opportunity, that in
24 some industries there is much more technological
25 opportunity, which means -- it may be because of some change

1 in basic science that's having a revolutionary impact, like
2 the impact of biotechnology on the pharmaceutical industry.
3 So, when there is greater technological opportunity, there
4 is greater turbulence, there is greater entry opportunities.
5 So, that's a new variable we need to bring in.

6 The appropriability regime is something we bring
7 in through the back door but is now absolutely critical. As
8 know-how, as industries become and sectors become much more
9 know-how oriented, the nature of property rights the firms
10 are dealing with are just very different from what it used
11 to be, and the degree to which intellectual property works
12 for an industry or for a sector, you know, is different. I
13 mean, in some industries, like the chemical industry, the
14 drug industry, intellectual property protection really gives
15 you protection. In other industries, it's sort of sporadic.
16 Even though in the Constitution it was recognized that
17 everyone should have the right to protect your invention, it
18 wasn't sort of anticipated that different inventions would
19 get protected differently because of inherent limits of the
20 patent system. And so that's another variable that we need
21 to focus on.

22 We need to focus on the characteristics of the
23 knowledge base of an industry, to what extent is it
24 proprietary, to what extent is it open, to what extent are
25 the universities contributing, to what extent is it really

1 coming from the private sector. Innovation can be -- and
2 change can be sometimes radical, sometimes cumulative. The
3 nature of industrial dynamics is different in an industry
4 where things gradually build on each other and innovation is
5 cumulative, versus industries where it's very radical. The
6 degree of staticity of knowledge, the extent to which it can
7 be codified affects the way it moves around, affects entry
8 barriers, things of that kind, the extent to which skills
9 and capabilities can be replicated or imitated very
10 dramatically across industries and according to
11 technologies.

12 Well, all of this is to say that there is a lot of
13 grist for the mill out there that we really need to be
14 looking at if we are really going to understand what is
15 going on, and let me, just to stir the pot a little bit,
16 suggest that perhaps even the whole concept of an industry
17 may not be particularly valid as a unit of analysis. It's
18 true that in the agencies, we tend to look at markets
19 anyway, which is good, but we still talk about industries as
20 if their boundaries mean something, whereas studies that
21 look, for instance, across industries and within industries
22 at differences in profitability of firms show that there is
23 far, far greater variability in performance inside an
24 industry than between industries. In other words,
25 industries really don't mean very much, and there is a whole

1 bunch of very firm-specific things that relate to specific
2 knowledge and specific assets and so forth which are far
3 more important in explaining the individual performance of
4 individual firms.

5 So, in the classical paradigm, if we look at an
6 individual firm and try and understand why it is where it
7 is, we say well, if it's in a concentrated industry, that
8 will affect its performance and its own market share will
9 affect its performance. Well, it turns out that there is
10 really no empirical evidence to support that as a major
11 explanatory factor, and the new evidence that's coming
12 forward is firm-specific things are far more important,
13 business units effects relative to large industry effects.

14 So, the firm is where the action is, and the
15 performance of individual firms is a function in the main of
16 where it's been in the past, the history of the firm, the
17 history of its past technological accomplishments, the path
18 that it's been on. The technological regime that it's
19 operating in, you know, the paradigm that determines the
20 future evolution of the technology and how that relates to
21 what the firm is currently doing matters minorly.

22 All of this is to say is that, you know, sort of
23 simple views of the world that have outcomes as a result of
24 concentration market share just really don't stand up to
25 empirical analysis. If they ever did, they don't do anymore

1 as more research comes forward. Actually, interestingly
2 enough, a lot of this research is outside the field of
3 industrial organization, it is in the field of business
4 strategy in business schools where people really worry about
5 trying to understand what determines the performance of
6 firms.

7 Now, how can this lead to mistakes in antitrust?
8 Well, I -- and the general theme, by the way, I want to put
9 forward is I do think in the agencies, there are a lot of
10 smart people, and they normally get things right, but, you
11 know, when you start off with paradigms that are pointing
12 you in the wrong direction, it takes you longer to work it
13 out than it should, and sometimes you may miss some things,
14 but when you get into private litigation where you don't
15 have the degree of sophistication that the agencies can
16 bring to bear, the opportunity for mischief is greater.

17 So, for instance, if, you know, I've certainly
18 been in a circumstance where I have heard many economists
19 argue that they see a firm that's got profits above
20 competitive levels or a group of firms that have got profits
21 above "competitive levels" for a considerable, long period
22 of time, that would suggest collusion. Not at all, not
23 necessarily at all. There could be some underlying,
24 firm-specific assets that relate to the nature of knowledge
25 and the generation of knowledge that explain this, and it

1 could even be embedded in the organization itself.

2 Organizational routines that are highly tuned and
3 enable, you know, a firm like Nordstrom's to out-perform
4 Macy's can exist for long periods of time, and they are
5 difficult to imitate. So, you can get significant
6 differences between firms continuing over long periods of
7 time, because, one, it is difficult to imitate, and
8 secondly, people may not even know why the firm is doing as
9 well as it is. And so there is causal ambiguity as to
10 really what is going on. So, all of this simply means that
11 we have to be a little bit cautious with respect to the
12 conclusions we draw when we observe differences in profit
13 rates amongst firms.

14 Now, let me use that as a background to address
15 sort of the fundamental distinction that I think exists, and
16 properly so, in antitrust thinking, and that's between what
17 economists call economizing behavior or efficiencies and
18 what might be thought of as strategizing, which is, you
19 know, business conduct that's aimed towards generating
20 economic rents and that may be built more on keeping your
21 competitor off balance, giving anti-competitive things or
22 things that in the main we may think of as anti-competitive.

23 I think antitrust in this new environment needs to
24 make a more informed distinction between what I call
25 economizing or efficiency behavior and strategizing

1 behavior. You know, economizing behavior leads to social
2 benefits, and we should be in favor of it. Strategizing we
3 think of as socially inefficient.

4 Now, economizing and strategizing are juxtaposed
5 in the following way: The evidence, I think, is mounting
6 that really strategizing, to the extent to which it works,
7 it doesn't work for very long, although strategizing that's
8 not based on economizing is worth nothing. There is a quote
9 from my colleague, Oliver Williamson, that I would like to
10 read to you along these lines. He says that strategizing
11 effort will rarely prevail if a program is burdened by
12 significant cost excesses in production, distribution and
13 organization. All the clever ploys and positioning, i.e.,
14 all the king's horses and all the king's men, will rarely
15 save a project that is seriously flawed in the first order
16 in de minimus respects.

17 Or put differently, and I think this is perhaps
18 directed to some of my colleagues that are pushing the new
19 game theory, that, you know, a lot of the new tricks that
20 we're inventing and the theory papers and they are winding
21 their way into the textbooks, first of all, they are not
22 useful guidelines for what can be accomplished, and
23 secondly, they really overplay the significance of
24 strategizing and its durability. Strategizing has no
25 durability unless it's built on some underlying

1 efficiencies, and, you know, if two firms are competing and
2 one is more efficient than the other, no matter how many
3 tricks you play, no matter what type of business conduct you
4 engage in, the more efficient firm is going to win, going to
5 prevail in the marketplace.

6 Put differently, a lot of the new sort of
7 strategizing literature coming from the new game theory to
8 me is only applicable in circumstances where firms are very
9 closely matched in other ways, that a fundamental difference
10 in efficiency will blow over and subsume any strategizing
11 behavior in rather short order.

12 Now, let me move on to address some of the
13 implications of that in the context of innovation, that I
14 think strategizing -- in thinking about strategizing and
15 business conduct, one has to distinguish between things that
16 are aimed at restricting competition and things which are
17 aimed at shoring up externalities in the innovation process.
18 There's a -- I find myself inclined to be willing to
19 tolerate various forms of business conduct which are aimed
20 at straight imitators and clones when the innovator has weak
21 intellectual property rights.

22 Or put differently, I can live and, in fact,
23 support most of the current law in the area of business
24 conduct when looking at circumstances where firms have got
25 strong intellectual property rights, but when they don't,

1 you know, business strategy is -- and various forms of
2 business conduct that might otherwise be objectionable
3 aren't quite so objectionable, because they shore up weak
4 intellectual property rights. And as I said earlier,
5 intellectual property is something or rights are really --
6 there is a lot of happenstance to whether or not you get
7 intellectual property protection, and the nature of the
8 technology has a lot to do with it.

9 So, the point simply is that I think there is
10 almost a bifurcation between industrial circumstances that
11 need to be recognized in the case of industries
12 experiencing rapid change, and that is where there is easy
13 imitation and no intellectual property rights versus where
14 there is strong intellectual property rights.

15 And let me just -- to make this a little more
16 concrete, I was actually involved in a case called Entry v.
17 Gore, it's a case that settled, but it went on for ten
18 years, and this was a circumstance where an innovating firm
19 had been involved in a co-development effort with an
20 upstream supplier to develop a new resin, and they did
21 develop a new resin, and the competitor complained that it
22 didn't have access to this new resin, which it had played no
23 role in developing and, in fact, brought antitrust action
24 claiming there was collusionary behavior and violated bad
25 acts. And in the end, the thing went away, but not until

1 after almost a decade of litigation, and this was, of
2 course, in response to a circumstance where the innovator
3 had sued the imitator for violation of intellectual property
4 and got an antitrust suit back. So, these issues are not
5 just entirely theoretical, and I'm sure that there is many
6 more examples that could be brought forward.

7 And this leads me to, of course, a fundamental
8 issue in antitrust policy, and that's the assessment of
9 market power. What does market power mean and what -- in
10 this new environment? Does it mean what we have always
11 thought it means? Does it mean something a little bit
12 differently? How do we assess market power?

13 Following the outline of the program, I want to
14 focus primarily on current generation products and make the
15 general remark that if an innovator really has got something
16 useful, if you take a mechanical SSNIP or guidelines type
17 approach, I think you may well find that the innovator is
18 going to have market power. I don't know quite how you deal
19 with that in the agencies. I think there's a good
20 recognition that if they are really small, we won't worry
21 about them too much, but it ought to worry you that the
22 basic framework that you use causes you to find market power
23 when you are not really worried about it.

24 And let me give an example, and I actually wrote a
25 paper on this a number of years ago with a number of

1 colleagues, it was published in Industrial and Corporate
2 Change, but an industry which I think can be used to
3 illustrate this is the diagnostic imaging industry, and, in
4 fact, in my paper, I have a chart which sort of points out
5 some of the basic properties of that industry and indicates
6 that in diagnostic imaging, and there is a number of
7 different modalities, magnetic resonance, x-ray, nuclear
8 imaging, digital radiography, ultrasound and so forth, and
9 these different modalities in some loose sense compete with
10 each other quite vigorously. Not only are there some
11 applications where you can use these modalities as
12 reasonable substitutes, but also if the manufacturers wanted
13 to, they could change the design some to compete more head
14 on with one of the other modalities.

15 Now, if you take something like that diagnostic
16 imaging, and I think if you just took the textbook SSNIP
17 approach to it, you may well conclude that each of the
18 primary players in each of these modalities had market
19 power. These were all very small firms, you know, probably
20 \$20 to \$50 million in sales, but the truth of the matter is
21 that they are competing vigorously, but they are not
22 competing primarily on price, they are competing primarily
23 on performance, invasiveness, the extent to which the device
24 invades the human body, the clarity of the picture, the
25 tissue specificity that's given. I mean, these performance

1 parameters are what buyers of imaging devices care about
2 almost more than price.

3 So, you know, if you ask what would consumers do
4 if there was a change in price, you know, whoever it is who
5 is making these decisions, particularly if it's a doctor,
6 will say well, probably nothing or not very much, because
7 they are thinking about these other performance
8 characteristics. So, the point simply is that when you have
9 new products, innovative new products, it's quality and
10 performance, it's the job that these products do that the
11 products that were there before didn't do which have
12 primary attention. And so if you start asking well, what
13 would happen if someone -- if a hypothetical monopolist
14 raised the price, you are really not going to key in on the
15 key competitive variable. So, that's a remark that I'll
16 come back to later, but this sort of standard textbook
17 approaches do, I think, sometimes lead one a little bit
18 astray on matters of that kind.

19 Similarly, I think if you looked to the
20 microprocessor industry and took a standard approach to
21 market definition, you might well conclude that Sun,
22 Motorola, AMD, certainly Intel, you might erroneously
23 conclude that they all had market power, because I don't
24 think too many of them would survive a SSNIP test, yet, you
25 know, we have a context where competition is almost

1 maniacal, and to the extent to which a firm has got
2 dominance, it's very fragile.

3 If an Intel screws up in one generation, it's not
4 there for the next. If you're successful in one generation,
5 you have a chance to be at the table and to compete in the
6 next round. There is a very, very different kind of
7 competition from, you know, what we saw in the steel
8 industry in the fifties, and yet many of the paradigms we
9 use are informed by the way competition took place in the
10 steel industry in the fifties. And, indeed, if you look at
11 the performance of the industry overall, if you, for
12 instance, if you look at Figure 1 in my paper, which
13 measures the performance in MIPS per second of
14 semiconductors over time, you know, you get an increased
15 performance of a thousandfold.

16 So, this is not the story of a couple of
17 monopolists sitting back and doing nothing, but yet the
18 paradigms that we might be implying to use in an attempt to
19 define market power don't take us all the way. And, in
20 fact, I suggested in a paper a couple of years ago that one
21 could accomplish a lot by just simply modifying the test a
22 little bit, and this, I think, is in the spirit of what I
23 see in Larry White's outline, that one should use these
24 approaches as general frameworks and not be too wedded to
25 them. That's why my criticism of them is more directed to

1 the mechanical application of them and, of course, the
2 implication is that good economists and lawyers never apply
3 these things mechanically.

4 But if, for instance, you just simply adjust the
5 test to recognize that while competition takes place not
6 just on the basis of price but on the basis of these
7 performance characteristics. There are methods in economics
8 that enable one to identify what these performance
9 characteristics are. So, you can say that -- you could take
10 one of these performance characteristics other than price
11 and say well, if there is four main characteristics upon
12 which customers place importance in making purchase
13 decisions, and if there is a degradation in the importance
14 of one of these by 20 percent, would that cause one to
15 substitute? And if the answer is yes, you would say well,
16 they are in the same market.

17 So, there are easy ways that these frameworks that
18 have been carefully brought up in the agencies can be
19 extended to embrace the reality of competition in markets
20 where there is rampant innovation and where competition is
21 taking place not just on the price variable, and in some
22 ultimate sense everything boils down to price, but where
23 performance characteristics are really what the selection
24 decisions are being made on. Or put differently, the SSNIP
25 approach is basically just fine if you are talking about

1 homogeneous goods, which are not experiencing technological
2 change.

3 I also suggest that there may be some need to
4 modify, you know, the two-year entry period. That's purely
5 an arbitrary number. It seems to me that actually a
6 parameter that one might want to hook onto is the length of
7 the product life cycle. If you see entry within the length
8 of a product life cycle, that would, you know, that wouldn't
9 be counted in the market, that in some sense a product life
10 cycle in microprocessors, for instance, it turns out if you
11 look at the data which is in my paper that about every four
12 years, there is a major new generation. So, maybe the time
13 frame should be tied to the turnover in each generation.

14 In that case, in that industry, it would be four
15 years. And maybe four years would be a good default rule,
16 but I think in some fundamental sense it should be tied to
17 the length of product life cycle, because as each generation
18 of the product rolls out, they really create windows for new
19 entry. So, looking at the microeconomics of the industry
20 and looking at when do these windows open up, when do new
21 players come in, if the answer is yes, you sort of put them
22 in the market, and if answer is no, then you don't.

23 Now, what does this mean with respect to HHI
24 thresholds? You know, the 1000, 1800 have become emblazed
25 in the guidelines as the proper ones, and, of course, we all

1 know they are arbitrary, but just consider the following two
2 industries. Let's consider an industry that has -- two
3 industries that both have HHIs of 1800. One, on the other
4 hand, is mature, has got strong appropriability, either
5 strong intellectual property if it's an industry where
6 intellectual property is important, or if intellectual
7 property isn't important, the basic property rights are well
8 defined. The key players have got strong positions and
9 complimentary assets, and compare that industry with another
10 one where there is rich technological opportunity, where
11 there is weak appropriability, where none of the key players
12 have got complimentary assets.

13 I would say that the same level of concentration,
14 an 1800 number in the second case, would indicate that there
15 is far less competition and far more opportunities to
16 exercise market power there than there would be in the
17 former one. Now, some of this maybe gets taken into account
18 for the way that entry analysis gets done, and maybe that's
19 the way to do it, but we ought to think about different
20 technological regimes and the degree of turbulence in
21 different tech know logical regimes and how that affects the
22 way one assesses competition.

23 And the -- if I may come back again to the
24 diagnostic imaging industry, there is this Table 3 here,
25 which actually charts what happens to the HHIs in these

1 different sectors or submarkets or modalities, whatever you
2 want to call them, and what's remarkable and perhaps not
3 surprising is that HHIs drop from 10,000 when the first
4 innovator comes in or the first company comes in to 2400 in
5 five years and down to 1800 in ten years.

6 Or put differently, it's very clear that if one
7 had a static sort of snapshot view of what's going on in
8 that market and you took a snapshot of magnetic resonance
9 imaging around 1974, you would get a very incomplete view of
10 what's going on. And all of this is a plea to sort of be
11 forward looking. Innovation requires one to be forward
12 looking and not backward looking, but because typically we
13 have data from the past, we tend to be backward looking,
14 and to be forward looking, you have to understand the
15 fundamental technological regime in which the industry or
16 the market is embedded. And all of this is simply to say
17 that we need a history and some understanding of industrial
18 dynamics if we are going to come to grips with these
19 questions.

20 Let me end by just making a few remarks on
21 innovation markets, even though that's not really the topic
22 for today. First of all, I have to confess I wrote a paper
23 in 1981 on the market for know-how, and then when innovation
24 markets came along, I realized that I really wasn't talking
25 about the same thing in my paper in '81 on the market for

1 know-how as we are talking about today when we discuss
2 innovation markets. There clearly is a market for know-how
3 out there, and it is of tremendous importance. By a market
4 for know-how, I am referring to a market for the output of
5 R&D.

6 This morning we had Mr. Donaldson from TI talking
7 about licensing of patents and trade secrets and so forth at
8 TI, and those of you that looked at TI's annual reports in
9 the last few years will know that over a four-year period, I
10 think they accumulated well over a billion dollars in
11 royalty income from licensing technology. Now, that clearly
12 is a know-how market that they are operating in, and it's
13 very important.

14 If you look at the trade statistics, U.S. exports
15 of technology are about \$20 billion, imports are about \$5
16 billion, but more importantly, you have to recognize that
17 that \$20 billion is just about all profit. There is no cost
18 of goods sold there. It has already been sunk. And so if
19 you convert that, if you assume that 90 percent of that
20 royalty income on the exports of technology is actually
21 profit and you assume that in goods markets it's about 6
22 percent, and these are national averages, then we can scale
23 up those technology exports to \$300 billion, which is six
24 times as large as the civilian commercial aircraft business.

25 So, technology markets are extremely important,

1 and U.S. exports of technology are qualitatively in the
2 order of magnitude six times as important as our exports of
3 civilian aircraft. So, there is definitely a market there.
4 There are people trading in that market. But I don't think
5 that's the market that proponents of innovation markets have
6 in mind, and in essence, I suppose the bottom line is that I
7 have trouble defining a market around an input, which is
8 R&D, for a number of reasons.

9 One is there isn't an active trade. There is no
10 market in the traditional sense of the word. I mean, we
11 developed the word market from, you know, going right back
12 to primitive times when people traded something. You know,
13 in R&D markets, there really isn't trading of R&D. There is
14 trading of the output. There really isn't trading of the
15 input. Maybe people will try to hire away scientists and
16 engineers from other places, but that's not the type of
17 activity we think of as trading in a market. So, there is
18 really a mismatch between the classical concepts of a market
19 and these so-called innovation markets. That's not to say
20 it isn't a valid concept, but one should recognize that it's
21 analytically a very different concept from what we
22 understand a market to be.

23 Now, I think that Gilbert and Sunshine have done a
24 lot to sort of cabin in the applicability of this concept.
25 They have pointed out, and I believe correctly so, that when

1 talking about innovation markets, they should only be
2 employed in circumstances where you can't otherwise analyze
3 competition or when you can't adequately analyze competition
4 by looking at goods markets. They point out that you
5 shouldn't talk about innovation markets unless there are
6 specialized assets involved, and they also point out that if
7 innovation is radical rather than incremental, one shouldn't
8 use the concept at all.

9 But even if you grant the basic concept, there is
10 a presumption in there that there is some connection
11 somehow, rather, between concentration and R&D and
12 innovation. Now, I do think in some loose sense that we all
13 recognize that rivalry and diversity in innovation is
14 important, but I must say that there really isn't any
15 statistical evidence that strongly connects or even weakly
16 connects R&D concentration in the market to innovative
17 performance, and, indeed, the reason why you can't find it
18 statistically, it's not because it isn't there, it's just
19 because it's relatively unimportant.

20 My last chart is one, it's Figure 5, which is from
21 a paper that's coming out in the Journal of Economic
22 Behavior and Organization, but it attempts to identify the
23 factors that affect the rate and direction of innovation. I
24 put this together without antitrust in mind, but as I looked
25 at it, I realized I didn't even -- and in coming up with the

1 factors that drive innovation, I have got the internal
2 culture and values of the corporation, the sources of
3 finance, the external linkages, I have got the human
4 resources and organizational capabilities and the
5 organizational structure. So, it's the formal and informal
6 structure of organizations, and the way that human resources
7 are managed is absolutely key, and that's what's a big
8 driver. It's a big horse that drives the system when it
9 comes to innovation.

10 If money is being spent on it, if you have got
11 good people, if they are in an environment where the
12 organizational structure is tailored to make them effective,
13 and that's sort of a firm level view of things. It's not
14 clear that there is evidence linking concentration and R&D
15 to innovative performance. And secondly, there is also a
16 major measurement problem that R&D is something that's very
17 proprietary, and if you simply just count participants in
18 the market by companies who put their hands up and say yes,
19 I'm doing this, you are surely going to underestimate the
20 investment that's going on in R&D.

21 So, I think, you know, innovation markets are --
22 is a useful idea to kick around. At the end of the day, I
23 am just not sure how much additional purchase it's going to
24 give us with respect to understanding what's going on, and
25 that I would favor -- if you are going to look at innovation

1 markets -- I believe there are know-how markets out there,
2 but they are output markets, like every other market we tend
3 to -- well, not like every other market, but we ought to
4 recognize that the only market where you can actually
5 observe transactions taking place is an output market.

6 So, let me just end on that point and summarize by
7 saying that I think that it -- we should be somewhat
8 skeptical of established doctrine in antitrust. I mean, in
9 a way, we are still living in what I call the -- despite
10 Chicago, we are living in the Harvard-Berkeley tradition,
11 the Harvard Joe Bain in the thirties and Bain at Berkeley in
12 the fifties. I mean, the guideline structure basically has
13 this notion that structure is really critical, and structure
14 does matter, but it is not critical, and so we have to, I
15 think, stop building more robust frameworks that enable us
16 to observe the new industrial dynamics as taking place out
17 there, we need a whole new set of variables, and there is --
18 the good news is, there is a lot of research going on on
19 these things.

20 And, in fact, one reason why I got the Sloan
21 projects plugged into this is that in major universities
22 around the country, there has been an outpouring of research
23 on these issues. It just hasn't found its way into
24 antitrust analysis. It's found its way into business
25 strategy literature, found its way into some industrial

1 organizations, but it is not quite there yet, but I think
2 it's a big thing, because I think it will help illuminate
3 some complex issues that you folks are going to have to deal
4 with in the future.

5 COMMISSIONER VARNEY: Thank you very much. I know
6 Jon is chomping at the bit, but we will keep moving and come
7 back to questions at the end if that's all right.

8 I would like to introduce Dr. White. Dr. Lawrence
9 White is the Arthur E. Imperatore -- what an impressive name
10 -- Arthur E. Imperatore, Professor of Economics at the Stern
11 School of Business at New York University. Between 1990 and
12 1995, Professor White was chairman of the Stern School's
13 Economics Department. Between 1986 and 1989 he served as a
14 board member on the Federal Home Loan Bank Board and during
15 1982 and 1983, he was Director of the Antitrust Division's
16 Office of Economic Policy. He has written books concerning
17 the automobile industry, ocean shipping and most recently,
18 the savings and loan industry. He is also the editor of The
19 Antitrust Revolution: The Role of Economics.

20 Thank you for joining us, Dr. White.

21 PROFESSOR WHITE: Thank you, and I want to echo
22 David in complimenting the Commission in deciding to hold
23 this set of hearings. I think they are very important.

24 In listening to David's testimony, I was trying to
25 figure out whether you were going to get a range of opinion

1 that went from A to B or A to Z, because there were times
2 when I was thinking gee, David is coming around, and then
3 other times when I figured oh, no, no, nope, he really
4 hasn't. And so I guess in the end, it's going to be from D
5 to L.

6 As I see the goals of the antitrust laws, they are
7 to encourage competition as a process and to discourage
8 market practices or market structures that would allow the
9 exercise of market power, either jointly or unilaterally,
10 where there are not sufficient counter-balancing efficient
11 gains. Now, let me stop right there and emphasize the issue
12 of markets and market power.

13 Sometimes David seemed to believe in markets and
14 other times not, and I fear that losing the paradigm of
15 markets loses the notion of market power. I can't figure
16 out how to deal with the whole notion of market power if we
17 don't have a notion of markets, and that's why I think the
18 paradigm of thinking about markets, thinking about firms in
19 markets is still a very useful one for considerations of
20 antitrust. If we are not prepared to live in that paradigm,
21 I guess you have got to close two-thirds of this building.
22 There may still be a room for consumer protection, but
23 basically antitrust goes away. I can't figure out what's
24 left without a market notion and a market paradigm.

25 Further, as a preliminary, I think it's important

1 for those who are not completely familiar with antitrust to
2 remember that the antitrust laws are enforced both by the
3 two federal antitrust agencies, the Federal Trade Commission
4 and the U.S. Department of Justice's Antitrust Division, but
5 also by private suits, including states attorneys general,
6 and criticisms of the enforcement of antitrust sometimes are
7 rather fuzzy as to whether those criticisms apply to the
8 federal agencies or whether they are applying to the
9 standards that the courts have developed in private
10 antitrust litigation. Those can be very different.

11 The third point I want to make is that if one
12 accepts the notion that markets are important, then the
13 delineation of the market, what are the rough boundaries,
14 who is roughly in that market, who could easily enter that
15 market, who with a bit more difficulty within a year or two
16 could enter that market is a crucial notion, because
17 generally wider markets have more participants and are less
18 susceptible to the exercise of market power.

19 Now, here again, I do believe that the paradigm
20 that has been adopted by the federal agencies on thinking
21 about market power in the context of mergers, the Department
22 of Justice and Federal Trade Commission's merger guidelines,
23 is a very useful one for delineating those markets and for
24 considering the likelihood of the exercise of market power
25 as a consequence of a merger.

1 As David pointed out, it's I think important to
2 think of those guidelines as primarily a conceptual device
3 for focusing on the possibility of exercise of market power
4 and for easily ruling out silly claims by litigants
5 concerning market delineation. One that I was very familiar
6 with involved a suit brought by the Federal Trade Commission
7 against the merger of two leading soft drink manufacturers
8 in which the counsel for one of the defendants claimed that
9 all potable liquids were in the relevant market.
10 Fortunately, the federal district court judge, as well as
11 the Commission, was not prepared to encompass such a wide
12 market when thinking about a merger of soft drinks, and,
13 indeed, in the sort of serious thinking about what are the
14 group of firms, if they were all combined into a
15 hypothetical monopolist, could raise prices significantly
16 and sustain them and find it profitable would find a
17 significantly narrower market than all potable liquids.

18 And so, again, thinking about the delineation of
19 markets in terms of we're concerned about market power, the
20 exercise of market power, is the merger in front of the
21 Commission, in front of the Division, in front of a court
22 likely to make things worse in terms of the likely creation
23 or enhancement of market power is the right way to be
24 thinking about the merger and be thinking about the market
25 delineation that has to be part of that consideration.

1 Now, in principle, the merger guidelines should be
2 forward looking. What would the market environment, its
3 structure, its behavior likely be prospectively, i.e., in a
4 year or two. What is likely to happen in the absence of the
5 particular merger or, you know, agreement or joint venture
6 or some other proposed arrangement, and then in the presence
7 of this proposed arrangement, what would likely be the
8 outcomes and are there significant differences. Again,
9 could market power be significantly exercised as a
10 consequence of the proposed arrangement either unilaterally
11 or through some kind of joint oligopolistic understanding.

12 Next point, as David alluded to, the market
13 delineation process, though it has been generally thought of
14 and defined in terms of a hypothetical price increase, ought
15 to encompass other possible behaviors, including product or
16 quality aspect behaviors that could attach to the potential
17 exercise of market power. So, it isn't just price increase.
18 It would be other attributes that could be a consequence of
19 the exercise of market power. And so as a -- as a
20 summarizing notion, I think you've -- one has to think of
21 the guidelines, the merger guidelines approach, as a
22 conceptual disciplinary and guidance device rather than as a
23 very precise blueprint. It can't be very precise, because
24 most of the time, neither set of parties nor the courts nor
25 the Commission nor the Division are going to have the very

1 detailed amount of information that would require -- that
2 would be required for the precise application, but again,
3 it's a very useful conceptual disciplinary and guiding
4 device.

5 Now, my next point, alas, the market definition
6 paradigm, though extremely useful for proposed arrangements,
7 a merger, a joint venture, an agreement of some kind, cannot
8 be used for assessing the boundaries of the market where
9 there are allegations of current monopolization going on.
10 That is true because of the sort of well-known phenomenon
11 that a monopolist, a firm exercising market power is going
12 to raise price or deteriorate attributes and save costs in
13 the process up to the point at which its customers start
14 switching away significantly to other firms or other firms
15 are significantly attracted to the -- to the market.

16 So that if one in an investigation of alleged
17 current monopolization tried to delineate the market by
18 asking what would happen in response to a significant price
19 increase from current or prospective price levels, you are
20 going to get the wrong -- you are going to get the wrong
21 answer, because you are asking the wrong question. If
22 monopolization is currently occurring, of course there will
23 be significant switching away. If there weren't, the
24 monopolist hasn't been doing its best on behalf of its
25 owners, on behalf of its stockholders.

1 In principle, for allegations of alleged
2 monopolization, the market delineation question has to be
3 asked in the context of the absence of the exercise of
4 market power, but this is extremely difficult. It goes to
5 the heart of the investigation, is there current exercise of
6 monopolistic power going on, and alas, I have seen no
7 satisfactory solution to this conundrum, but again, the
8 basic point is the delineation paradigm I think works very
9 well for proposed arrangements. It does not work well, and
10 I have seen no satisfactory substitution for it, for
11 allegations of current abuse, current exercise of market
12 power.

13 Now, all of what I have just said applies to the
14 way the two federal agencies have approached prosecutorial
15 decisions. There are no uniform standards or approaches
16 that have been adopted by the federal courts, and so it's a
17 hodgepodge, and one always has to take one's chances before
18 a federal district court judge.

19 Now, specifically turning to the questions posed
20 here at these set of hearings, I think the paradigm that
21 I've been describing is a good paradigm. I think it's
22 useful, I think it gets the agencies and would get the
23 courts a significant way down the road in assessing proposed
24 arrangements that might lead or might not lead to the
25 exercise of market power. I see no good arguments for

1 loosening of the relevant parameters. That would have to
2 rest on the proposition that market power was less likely to
3 be exercised in such industries because of some
4 environmental features that are not incorporated in the
5 merger guidelines approach or that will somehow be
6 overlooked by the paradigm, and I don't see it. I don't see
7 the empirical studies to support that proposition.

8 Last, let me echo David, and here we are really A
9 to B rather than D to J or D to L, I agree with David that I
10 do not think that an innovation markets approach is a useful
11 or a worthwhile advance in antitrust analysis, because like
12 David, I want to focus on markets, and for the most part,
13 the research and development that is described as being of
14 concern is not happening in a market. It's mostly happening
15 in house. There are no arm's length transactions between
16 suppliers and customer. There are no prices, there are no
17 readily recognized indicia of market power, and so I -- it
18 may well be that there could be research and development
19 consequences following a merger, following some other kind
20 of proposed arrangement. If so, the concern has to be the
21 consequences for output markets somewhere somehow.

22 If there is a market innovation where firms are
23 selling the patents, selling licensing, doing some kind of
24 market transaction, great, focus on that market. If not, if
25 one is concerned about the outcomes in specific product

1 markets and those outcomes are going to be worse because
2 research and development is going to slow down as a
3 consequence of the proposed arrangement, great, focus on
4 that, but I don't see the great use of the -- at least the
5 way I understand the notion of an innovation market, I don't
6 get it, and I don't see its usefulness.

7 So, in conclusion, antitrust analysis should focus
8 on the likelihood of the exercised market power and on the
9 possible offsetting efficiencies that may arise as the
10 consequences of current or prospective market structure or
11 practices, and again, I think a focus on markets is a useful
12 focus, it's a useful paradigm, and within those markets, the
13 exercise of market power as a consequence of a proposed
14 arrangement or as a consequence of current arrangements is a
15 useful way to be approaching the problem. If we don't have
16 markets, I don't understand how to assess market power.

17 The potential usefulness of analytical tools
18 should be appraised in terms of how well they sharpen
19 that focus, and finally, I believe that the Department
20 of Justice and the Federal Trade Commission merger
21 guidelines paradigm passes that test of usefulness, but
22 I do not believe that the concept of innovation markets
23 passes that test.

24 Thank you for the opportunity to appear here this
25 afternoon.

1 COMMISSIONER VARNEY: Thank you so much,
2 Professor. Just to catch up on where we are, we are now at
3 innovation zero, none two. Judy will change the balance.
4 We are delighted to welcome Ms. Whalley here this afternoon.
5 She is a member of the firm of Howery & Simon, who we
6 see quite often. Prior to joining that law firm, she
7 spent 15 years with the Antitrust Division, serving as
8 a trial attorney, Assistant Chief of the Special Litigation
9 Section, Chief of the Chicago Field Office, Deputy Director
10 of the Office of Operation, and finally, the Deputy
11 assistant Attorney General for Litigation. In 1988,
12 President Bush named Ms. Whalley Distinguished Rank
13 Executive, the highest award bestowed on senior government
14 executives. She has written and lectured extensively on
15 antitrust issues and teaches antitrust as an adjunct faculty
16 member at Georgetown University.

17 Thank you so much for joining us.

18 MS. WHALLEY: Thank you very much.

19 Let me say also that I am delighted to be here. I
20 think these hearings are one of the most exciting events in
21 antitrust in the last decade and the potential for stepping
22 back and reevaluating outside the context of a particular
23 case what the agencies are doing and why is an extremely
24 useful exercise.

25 I would like to start by agreeing with both of my

1 colleagues that assessing antitrust -- the role of
2 innovation in antitrust and how, if at all, antitrust
3 analysis should be modified to take into account the
4 increased importance of the dynamic innovation that takes
5 place in many markets is a very important issue, and the
6 antitrust law has a long history coming up into the
7 mid-seventies of being a very static, very non-innovative
8 science and one where often competitive realities were
9 ignored, but I think I have to start taking issue after that
10 point.

11 I think that there is no question that the simple
12 view that concentration and industry structure controls the
13 likelihood and the direction of future competition has been
14 discarded in the antitrust law. You know, the -- I have
15 just been teaching a segment on merger law in my class, and
16 last session we ended up with Von's Grocery, which is about
17 as great an elevation of the importance of market structure
18 and market share as one could find in the antitrust law,
19 but tonight, we are going to be talking about General
20 Dynamics, and captured in that eight-year period, I think,
21 is a tremendous transition in the antitrust law and
22 antitrust thinking to move to a realistic evaluation of
23 future competition in assessing the antitrust impact of
24 conduct or transactions, and I think that the law has made
25 that movement, and I think that the FTC-DOJ guidelines

1 certainly incorporate that notion of being forward looking
2 and not relying upon static, structural analysis into their
3 thinking.

4 And I think that that is -- that is critical and
5 that the use of the guidelines in that way is critical, but
6 I think that one of the great blessings of the guidelines is
7 that they are like the common law. They have tremendous
8 flexibility. The one criticism that I would have of the
9 current iteration of the guidelines is that they have tended
10 to become too specific and too detailed, and as a result,
11 they have moved away from the flexibility that has been
12 their hallmark, and as I say, their blessing, but I still
13 think that even within these guidelines, the concerns that
14 Professor Teece in particular was expressing about not
15 losing sight of the likelihood that future competition may
16 not look anything like present competition, that is still
17 there and still encompassed within the guidelines, and I
18 don't feel that we need to make changes in the basic
19 paradigm to address that.

20 Innovation has been a poor step-sister in the
21 antitrust law in two ways. First, in terms of the kind of
22 dynamic analysis of how innovation is going to affect the
23 future competition that I have just been talking about, but
24 second it has been a poor step-sister in terms of there not
25 being enough care and attention given to the impact on

1 innovation from practices and transactions, and I for one am
2 pleased to see the agencies beginning to refocus on that
3 issue and devote more attention and more concern to how
4 innovation and the dynamic nature of markets can be
5 protected through antitrust enforcement actions.

6 Let me steal a thought from Professor Willig about
7 what the guidelines are. I have always liked this visual
8 image, because to me it captures the notion of the
9 guidelines, and that is the guidelines as a freeway with a
10 lot of exits. One gets on the freeway headed towards the
11 question of whether there ought to be a challenge to a
12 transaction, but there are a number of exits along the way
13 where one could and should get off.

14 The first exit is the question of market structure
15 and concentration, and I don't see that as a decision that a
16 suit is more likely than not. A decision that a market is
17 highly concentrated simply is a necessary condition to keep
18 going on the freeway. If you don't find that concentration,
19 you get off the freeway right there, but you have got a long
20 road to travel on before you come to a conclusion that a
21 merger is going to be anti-competitive.

22 The next freeway exit is competitive effects, and
23 once you've decided that the market is concentrated and the
24 merger is going to make that concentration worse, create a
25 higher concentration, you still have to decide whether there

1 is likely to be a competitive effect from the transaction in
2 question. If not, you get off another freeway exit, the
3 freeway exit of competitive effects, and that is where
4 General Dynamics led us. In General Dynamics, the market
5 was very concentrated, much more concentrated than Von's
6 Groceries, for instance, but the court said that doesn't
7 matter. What matters is the likely future competitive role
8 of the companies in this industry, and only by assessing
9 that can we determine if there is likely to be a competitive
10 effect from the merger.

11 So that I think that assessing innovation in
12 determining markets, market share is extremely important,
13 but we also shouldn't forget that there is another place
14 that innovation and the likely future competitiveness of
15 companies gets considered, and that's in assessing
16 competitive effects, and I think that within the guidelines
17 paradigm of assessing markets and the paradigm for assessing
18 competitive effects, there is certainly room to take into
19 account the concerns we have that innovation and this
20 churning that may go on in some industries is going to make
21 the future competitive role of the companies very different
22 than the role today.

23 Let me talk a little bit about assessment of
24 market power and the question of whether the SSNIP is an
25 appropriate test or whether we ought to be moving to an

1 attribute-based SSNIPP -- I guess it's a SSNIPP with a
2 double P? Is that -- have I got it right?

3 PROFESSOR TEECE: Yes.

4 MS. WHALLEY: I find this notion of using an
5 attribute-based test very intriguing, and I would certainly
6 like to think about it further, but I have a couple of
7 questions, and I know we are not to the round table yet, but
8 let me throw out my questions about the attribute-based
9 test.

10 One, as a practitioner, I have some concerns about
11 the practical application of it and how easy to make
12 judgments about what a 25 percent reduction in quality
13 really means, but let's leave that aside. Generally if a
14 theory is sound, one can always find a way to apply it,
15 challenging as it may be, but my other two questions are,
16 how does this attribute test take us back to the underlying
17 question we have about whether the merger is going to enable
18 the firms in the industry to exercise market power?

19 I see two ways that it might, but I have some
20 questions about whether it's the best tool for either. One
21 is much like the relationship of the price increase to a
22 concern that prices could be elevated as a result of
23 increased market power. Perhaps we are concerned that the
24 companies in the industry exercising market power might
25 reduce quality as opposed to increased price. Clearly

1 there's a price-quality relationship in every market and for
2 every product.

3 The second possible explanation that we are trying
4 to capture with this attribute test is the fact that there
5 is an evolution of products in the market, and what we're
6 really trying to capture there is the fact that the next
7 generation product may be different and may compete in
8 different ways and may present a different price-quality
9 trade-off to customers in the marketplace, and by using the
10 attribute-based test, we are trying to capture this notion
11 that the players are going to look different, have a
12 different role, have a different competitive effect in the
13 future.

14 If what we are trying to do with the first is to
15 assess market power that might be accomplished by
16 diminishing or changing quality as opposed to diminishing or
17 -- raising or changing price, then I'm not sure that the
18 price test doesn't capture that with certain adjustments,
19 and is it more easily applicable? Most every product has a
20 price-quality trade-off associated with it, and I'm not
21 familiar with the facts in the two particular industries
22 that Professor Teece talked about, so I really can't speak
23 to those at all, but generalizing from other experiences I
24 have had in the division and in private practice,
25 notwithstanding the fact that goods may have very different

1 quality attributes than other products in the market, there
2 is generally some price point at which consumers are willing
3 to trade off those quality benefits for a lower price, and
4 so you may find products with very different product
5 attributes and very different prices nonetheless in a price
6 equilibrium in the market, such that a change in the price
7 of one will cause a shift to the other, notwithstanding the
8 prices are very different today.

9 I think it is a valid concern that in a market
10 where new products, innovative products are introduced, that
11 that price equilibrium takes some time to reach and that you
12 may find, as consumers are becoming more familiar with the
13 products and the benefits, that there is less direct price
14 competition and there is more a feeling out of how to make
15 those trade-offs. I think that that argues more for an
16 adjustment in how one uses the price test than an
17 abandonment of the price test and adoption of this attribute
18 test that I think will be more difficult to apply.

19 To the extent that what we're trying to capture
20 with the attribute test is the notion that what the
21 companies in the industry look like today and what their
22 products look like today may be very different tomorrow, I
23 think that may be better captured by a more forward looking
24 assessment of the relative roles of the companies, a la, a
25 General Dynamics analysis. If you have a product where

1 product generations are turning over every two years or
2 every year or every three years, there is no question but
3 last year's sales don't mean a heck of a lot and that we
4 shouldn't be paying a lot of attention to those sales
5 numbers. They are meaningless.

6 If product generations are turning over that fast,
7 what a company did last year is not good evidence of what
8 it's going to do next year. And this is a place where I
9 think that the role of the analytical framework that was set
10 out with relation to innovation markets by Gilbert and
11 Sunshine may give us a new analytical tool in addition to
12 its use on innovation markets, which I hope to speak to
13 tomorrow rather than today. I think that tool, which says
14 let's look at whether there are specific assets, specialized
15 assets that a company must have to effectively innovate in
16 this market, whether there are other companies that have
17 that, how important it is to have those specialized assets,
18 may give us a tool for predicting the role of companies in
19 the future.

20 It's certainly not the only tool that we would
21 want to use, but I think a combination of the anecdotal
22 evidence of what companies have under development, where
23 their research is headed, their history of introduction and
24 acceptance of innovation, combined with this new analytical
25 tool of asking whether they have specialized assets that may

1 not be available to others or even within the existing
2 market players there are some who have the specialized
3 assets and some who do not, can give us information to try
4 and assess what the market will look like in the future, and
5 it is that market that we have to consider in determining
6 whether there is a risk in the exercise of market power.

7 I think the guidelines are flexible enough to do
8 that. I have seen mergers handled within the Department of
9 Justice where the Herfindahls were off the wall, approaching
10 monopoly, but where, in fact, because innovation was playing
11 a major role and because it -- past market shares were not
12 at all predictive of future market shares, there was a
13 decision made not to challenge the merger, and that was
14 within the existing paradigm, not as fine-tuned as the
15 current guidelines, but certainly consistent with the
16 current guidelines and their paradigm.

17 So, I believe that the flexibility is already
18 there and that it has been applied in an appropriate way,
19 but I am now pleased to see growing concerns at the agencies
20 about how to protect innovation in addition to how to
21 incorporate it into an assessment of the likely future
22 competitive effects in the market.

23 In closing, let me just touch on this point that I
24 made earlier, that market definition and assignment of
25 market shares is not the only place to take this into

1 account. In assessing the likely competitive effects, we
2 have another opportunity to revisit the question of whether
3 market shares are meaningful. Having high market shares and
4 high concentration simply tells you that you have to look
5 further. It doesn't tell you that you have a problem, and
6 when we are at the point of studying the likely competitive
7 effects, certainly an industry in turmoil, an industry where
8 innovation is churning the waters, is going to be an
9 industry where the likelihood of any kind of a coordinated
10 outcome is extremely small, if not non-existent.

11 So that even if we conclude that market shares are
12 still going to be high and concentration is going to be
13 high, the very innovative dynamic of the industry might well
14 lead to a conclusion that there is no likelihood of
15 competitive effects. I think there must be greater care
16 paid to the issue of unilateral competitive effects in those
17 circumstances, but even there, we have to be very careful in
18 concluding in an extremely dynamic industry that there is a
19 likelihood of an adverse outcome from a merger.

20 Thank you very much.

21 COMMISSIONER VARNEY: Okay, why don't we take a
22 short ten-minute break, and when we come back, we would like
23 Professor Mowery to join our round table discussion and
24 perhaps we could start with one of Ms. Whalley's last
25 points, that is, shouldn't we be using Gilbert and Sunshine

1 where we have got a transaction that has significant
2 innovation. We will start after the break.

3 PROFESSOR TEECE: Okay.

4 (A brief recess was taken.)

5 COMMISSIONER VARNEY: Okay, are we ready to get
6 started? Professor Whalley?

7 MS. WHALLEY: Well, let me pose the question that
8 I had in the middle of my remarks kind of to start off the
9 round table, and that's to Professor Teece.

10 The use of the attribute test, the double P
11 SSNIPP, how does that tie back, if it does, to the
12 underlying concern about whether the transaction is going to
13 increase the likelihood that market power is exercised? I
14 outlined two ways that I thought it might be related and
15 pose the question for both of those, might it not be
16 possible to address those concerns with the existing price
17 SSNIP, perhaps modified, and that price SSNIP might be more
18 easily utilized than the attribute test?

19 PROFESSOR TEECE: Well, I am not 100 percent sure
20 I understood everything that you said, but basically the
21 idea is to use the SSNIPP to define the market correctly,
22 that if, in fact, a product is purchased not just on price,
23 but there are three other attributes that are equally
24 important, then mechanically what one can do is one can
25 first of all identify those using hedonic analysis, and to

1 the extent to that you can find that there are statistically
2 significant explanators of consumer preference, then you can
3 ask the question now, what will happen if one of these key
4 performance variables changed and test the sensitivity of
5 those, along with testing the sensitivity of price.

6 Now, it does not mean to imply that you think the
7 likely behavior or the expected behavior is a degradation in
8 quality, that's not the point, although it could be. I
9 mean, the fact that you have multiple attributes means that,
10 in fact, the kind of anti-competitive behavior you would be
11 guarding against is not just a price increase, which is what
12 you implicitly think of with a SSNIP, but degradation in
13 quality or lack of enhancement of those features. But
14 basically, conceptually, the argument is you use the
15 multiple attributes to properly define the market, and that
16 does not necessarily mean that it's sort of, you know, more
17 permissive. I mean, on the merger side, it could go the go
18 the other way.

19 For instance, you could easily end up with very
20 narrow markets using a simple SSNIP approach, without the
21 double P, for a product or for a set of products where, in
22 fact, you know, innovation is critical, and you could end up
23 defining something as a conglomerate merger when, in fact,
24 it's a horizontal one. So, the approach, I think, just
25 simply enables you to -- I think there is some language from

1 a court case to sort of define or see competition where it
2 exists rather than just on price. And once you properly
3 define the market, then this sort of analysis, as it exists
4 in the guidelines, proceeds pretty much the same way. I
5 don't know if that's responsive --

6 MS. WHALLEY: No, I think it is. Let me ask a
7 follow-up, though. The ultimate concern that the guidelines
8 try to address, as Professor White pointed out, is a concern
9 that as a result of the transaction, market power might be
10 exercised.

11 PROFESSOR TEECE: Right.

12 MS. WHALLEY: The SSNIP test, the price test,
13 enables you to assess whether there is market power in those
14 firms such that they could raise price without drawing other
15 competition. Why isn't that sufficient to enable us to
16 answer the question that we're looking to, which is can
17 price be elevated as a result of this transaction?

18 PROFESSOR TEECE: Well, I suppose if you sort of
19 spilled all of this back into some sort of price measure,
20 perhaps conceivably you could, but you would be preserving
21 the framework and distorting the fundamental economics of
22 it. So, I'm not sure that that would be as efficacious as,
23 you know, seeing competition where it exists, drawing the
24 boundaries accordingly, and then, you know, being ready to
25 anticipate that, you know, anti-competitive behavior or

1 monopolization can involve things other than raising price.

2 PROFESSOR WHITE: David, I don't get it. Suppose
3 we have got your imaging -- I'm not -- in deference to you,
4 I won't call it a market, but you have got firms in this
5 group of firms that produce imaging products and two of them
6 want to merge. How else can you figure out whether this is
7 something that ought to be brought to the attention of the
8 Federal Trade Commission if not by asking, first, all right,
9 let's take these two firms in front of us. Post-merger,
10 would they be able to raise prices significantly above where
11 they are today? Yes, they could. Ah, we have got a problem
12 here. No, they couldn't. All right, let's extend the
13 boundary a little bit more and ask the question again, keep
14 on extending the boundary until we get the answer yes.

15 Now we have a boundary, now we go the -- down the
16 freeway a little bit and start asking okay, within that
17 boundary, what are the -- what are the likelihoods that
18 prices would, in fact, be raised post-merger, either by
19 these two firms or by the group as a consequence of this?
20 But still it's a -- it's a market power exercise question --
21 exercise that's being posed.

22 PROFESSOR TEECE: Yeah, and paradoxically or
23 ironically in the case that you just raised, that if, in
24 fact, you applied the -- a straight SSNIP without the double
25 P, you would find that all these modalities possibly don't

1 compete, they are in separate markets, and so they are all
2 individual monopolists, and you are just combining five
3 monopolists together, in which case there is no change to
4 the HHI.

5 COMMISSIONER STEIGER: Dr. Teece, a hopefully
6 related question, but if I add the second thing, I presume I
7 also have to at least consider buying into your concept of
8 somewhat of a longer cycle of life cycle, if you will, in an
9 innovative or dynamic industry. It seems to me we have
10 enough problem prospecting, if you will, in the ordinary
11 world. What kind of danger am I going to get into with your
12 longer life cycle analysis when I think historically, even
13 in very innovation-driven markets, you do see, have seen,
14 plateaus or a waning? So, how can I be sure that because
15 there has been a new generation, advance in computers, for
16 example, or maybe in imaging on the average of four years,
17 what assurance am I going to have that that dynamism will
18 continue sufficient enough for me to say we are not going to
19 worry about two years, we will worry about four?

20 PROFESSOR TEECE: Right.

21 COMMISSIONER STEIGER: What if I'm wrong at the
22 end and we have reached a plateau in innovation or in
23 development?

24 PROFESSOR TEECE: I mean, that's a very good
25 question, and let me answer it in two parts.

1 First of all, I put the four years forward as a
2 default period. In fact, it could be less than that. I
3 actually prefer to tie it to sort of the generational life
4 cycle, which happens to be about four years in
5 microprocessors. In certain software products, it may only
6 be two years or three years. So, it is not necessarily four
7 years and it is not necessarily longer than the existing two
8 years.

9 But having said that, you ask an excellent
10 question. I mean, how does one have confidence as to what's
11 going on, and that's where industrial dynamics comes in.
12 That's where you look back and say what is the technological
13 opportunity here, what is driving it? Is it a change in
14 basic science? Can we expect it to continue?

15 I mean, like in the semiconductor industry, we can
16 be fairly confident for the next five, seven or eight years
17 that we are going to move down the same price performance
18 path, because the engineers will tell us it is still
19 possible, they haven't hit the wall yet on line width in
20 terms of the physical limits. So, therefore, by going back
21 in and asking questions of a more engineering/scientific
22 kind about the sources of know-how and the limits of the
23 technology, you can get answers to it, and you, you know,
24 I'm glad you raised that question, because it sort of
25 invites the type of analysis that I think is proper.

1 I'm not saying we will always get answers that are
2 necessarily satisfying, but at least you will ask the right
3 question.

4 COMMISSIONER STEIGER: Okay, let me refine it and
5 take you out of your easy world, microprocessors, where I am
6 sure that even an idiot like myself could tell you that I'm
7 aware that the generations of software development have been
8 coming at such a dizzying pace with such a dizzying number
9 of refinements that I would be quite confident that the
10 limit is not reached until some indeterminate period, but
11 explain to me a harder kind of a market, an innovation or an
12 R&D market that may require any number of permits or review.
13 Drugs come to mind, pharmaceuticals come to mind, certainly
14 perhaps environmental products that might need EPA review or
15 whatever. Add that dimension of uncertainty, and then what
16 do I do with trying to apply a longer time frame, even in an
17 area where there has been innovation?

18 PROFESSOR TEECE: Well, it is a more difficult
19 question, but, you know, if you do have a drug approval
20 process, for instance, it may indicate that, you know, if
21 someone tries to take advantage of market power, there is a
22 certain lapse before there is a competitive response. I
23 mean, what you want to do is to capture whether or not this
24 is an industry where there can be a competitive response. I
25 think, you know, if it took five years to get the drug

1 approval process, you would have to use that longer period
2 to capture competition. Otherwise, you necessarily
3 foreclose the examination of competition, because the
4 regulation doesn't permit him to move any faster.

5 So, on the one hand, yes, I mean, you may be
6 saying gee whiz, this decision may perpetrate some market
7 power for a period longer, but the problem is with the
8 regulation. It's not with the fundamentals of the economics
9 or of the business marketplace.

10 PROFESSOR WHITE: But David, doesn't that then
11 say, well, let's be a little careful about product cycle as
12 the delimiter of how we think about entry as a limitation on
13 market power? Five years -- to me, five years is a
14 significant period of time to be waiting for competitors to
15 come along and undercut the exercise of market power.

16 PROFESSOR TEECE: Well, but if it's because of a
17 regulatory barrier, you may want to focus your efforts on
18 changing the regulatory barrier.

19 PROFESSOR WHITE: These people don't have that
20 luxury, alas.

21 MS. WHALLEY: But doesn't that miss the underlying
22 purpose of merger enforcement? It's almost like you're
23 valuing competition just for its own sake and saying well,
24 the competition can't occur for five years, so extend the
25 entry test to five years. Again, the purpose here is to

1 avoid the exercise of market power, and the courts and the
2 agencies have adopted consideration of entry, because entry
3 precludes the exercise of market power. Either the entry is
4 going to happen quickly enough that the firms in the
5 industry don't raise prices at all, so that the entry
6 doesn't come in and add capacity to the market, or if they
7 do raise prices, the entry comes in and drives prices back
8 down. That's why entry is important. It prevents that
9 increase in prices to an anti-competitive level.

10 The fact that there is a regulatory barrier that
11 precludes the entry for coming in for five years to me says
12 that if we permit a merger of two firms that otherwise would
13 be competing and keeping prices at a competitive level, we
14 permit that merger, then prices will rise, and five years is
15 not going to be enough to deter current super-competitive
16 price increase, and it won't for five years happen to erode
17 the price increase, and therefore, this merger is going to
18 have ill effects on consumer welfare. The fact that the
19 product cycle or the regulatory scheme precludes entry for a
20 period of time to me seems to support a concern rather than
21 to argue that we ought to extend. I mean, maybe competition
22 won't happen for five years, but that -- as a result, that
23 competition can't keep prices at a competitive level.

24 PROFESSOR TEECE: Well, I don't want to hog the
25 air time. Let me make two responses.

1 First of all, I put fourth the five-year period is
2 a suggestion, and the competition is a two-year arbitrary
3 number. I am trying to ground is it in something that makes
4 economic sense.

5 Secondly, coming back to the point you raised, I
6 certainly understand, but we are not making policy and
7 deciding whether to move mergers forward or not based on
8 whether, you know, competition is manifest in two or five
9 years. It would seem to me that you could run the argument
10 backwards and say well, if it's five years, but you know
11 it's there, and the only reason it's five years is because
12 of regulation, that that's not sufficient reason to block
13 it, because you're making this decision presumably for
14 perpetuity and not just for a short run decision.

15 So, to the extent to which you have a forward
16 looking, long run perspective, you want to be able to
17 capture competition when it exists, and when it doesn't
18 exist, you want to be able to say no, but it's going to
19 exist -- if you comfort it, it is going to exist, but the
20 regulatory barrier is going to flaunt it for five years. It
21 would seem to me in that case you would accept the five
22 years, albeit with a recognition that the problem is
23 somewhere else.

24 COMMISSIONER VARNEY: Chairman Pitofsky?

25 CHAIRMAN PITOFSKY: I would like to direct your

1 attention to a related set of questions, and I would like
2 you to say a little more, Larry and David, about what do you
3 really mean that we can never have anti-competitive effects
4 in a research market, that we can never define an R&D
5 market, or do you mean hardly ever, because if it's hardly
6 ever, and most people would agree -- in any event, I
7 certainly agree that the data is ambiguous, it's hard to
8 define an R&D market, ideas float across national boundaries
9 and so forth. It may be that anything that happens in the
10 R&D market is going to affect the product market eventually,
11 all those things are true, but are there not situations --
12 for example, we have now talked about FDA regulation where
13 only two firms are halfway down the FDA approval system,
14 they are four years ahead of anybody else, they are not
15 going to come on the market for another four years. This is
16 a problem we really face every day, and they propose to
17 merge or a joint venture, they are the only two.

18 Or in the defense industry, DOD has decided that
19 they will subsidize only two players or they will only allow
20 two prototypes or they will give only two players secret
21 information, and they are the only two left. The concern I
22 have is if you don't define an R&D market and act early, you
23 may never catch up with the anti-competitive effect, because
24 once they merge or once they cross-license and obtain the
25 patent or once they have developed a new weapons system,

1 nobody is going to catch up with them. So, with that long
2 introduction, might there not be some situations in which an
3 R&D market and anti-competitive effects in an R&D market
4 make sense, and if not, why not?

5 PROFESSOR WHITE: Okay, let me tackle that one,
6 Chairman Pitofsky.

7 No, and the reason why -- I mean, just taking your
8 hypothetical, the place to look is four years down the road,
9 you're decreasing competition in your drugs four years down
10 the road, you seem quite confident that that's the case,
11 fine, that's the place to focus your antitrust attention.

12 CHAIRMAN PITOFSKY: Let me interrupt. You
13 understand, the merger takes place now.

14 PROFESSOR WHITE: That's right.

15 CHAIRMAN PITOFSKY: Four years from now it's a
16 monopoly case.

17 PROFESSOR WHITE: That's right -- no, and right
18 now it's a merger because of the future exercise of market
19 power in those pharmaceuticals as a consequence of this
20 merger.

21 CHAIRMAN PITOFSKY: You say wait it out, four
22 years later, I suppose -- we could use General Motors, we
23 say well, now I see there is an anticompetitive effect, now
24 strike down the merger that took place four years ago?

25 PROFESSOR WHITE: No, I want to stop it now.

1 CHAIRMAN PITOFSKY: You do want to stop it now?

2 PROFESSOR WHITE: Yes, yes, but I don't want to be
3 focusing my attention and use as my justification the R&D.
4 I want to be saying that this is going to have consequences
5 in the output markets.

6 CHAIRMAN PITOFSKY: David, do you agree, stop it
7 now?

8 PROFESSOR TEECE: I'm not sure I agree with that.
9 Let me back up and try answering the question fundamentally.

10 The problem is Larry somehow or other this morning
11 got the idea that I was abandoning markets. I was doing
12 anything but, and, in fact, in my discussion of know-how
13 markets, I was reinforcing the notion that I'm willing to
14 talk about market and market power when there is a market.
15 But there isn't an R&D market, as such. I mean, you know,
16 there is a know-how market, which is the output of R&D. So,
17 I would be willing to embrace a know-how market concept or
18 if you want to call it innovation market, fine, so long as
19 it's basically looking at outputs, but the R&D is really not
20 something that, you know, it's an input into something, and
21 the R&D isn't itself traded. I have trouble conceptually
22 identifying a market where there is no transactions and
23 talking about competition in the market where there is no
24 transactions. If there are transactions, it's a different
25 thing.

1 In essence, what the know-how market concept comes
2 down to is a notion, I think, that some firms have very
3 specific assets of one kind or another that are important to
4 the innovation process and, you know, you're concerned about
5 putting them together and reducing diversity, and at some
6 level I think I have that concern, but the apparatus of a
7 know-how market I think is so fraught with opportunities for
8 mischief that I'm not willing to endorse them at this point.

9 COMMISSIONER STEIGER: Somebody brought up the
10 nasty word of a monopolization case, and that led me to want
11 to press Dr. White a bit, if I may, on his statement that
12 the paradigm of the current merger guides really doesn't
13 work in analyzing monopolistic conduct already in existence.
14 I find it a fascinating concept, but I did want to ask if,
15 since this is looking globally, you thought that any of the
16 European Commission analysis of dominant firm conduct helps
17 us. We have had suggestions that in market definition and
18 market power definitions, our standards are too high for,
19 quote unquote, "monopolization," and the answer is to look
20 at a dominant firm when we think about market power, which
21 has a somewhat lower, as I understand it, level of
22 concentration.

23 Have we learned anything from those folks using a
24 somewhat different paradigm on market power?

25 PROFESSOR WHITE: I am not as familiar with the

1 European approaches as perhaps other people in this room,
2 and I am out here on very thin ice, and --

3 COMMISSIONER STEIGER: We all are, that's fine.

4 PROFESSOR WHITE: -- I probably should be fearing
5 to tread, but I am going to rush in anyway.

6 No, I don't think we have learned a lot. I think
7 they have mostly gone ahead and done things that really were
8 not in medium to long-range interests of the efficiency of
9 their economies. And so no, I don't think the European
10 Commission's dominant firm approach has been a very
11 productive one.

12 PROFESSOR TEECE: I can't talk about Europe, but
13 let me talk a little bit about New Zealand, which has some
14 of the same aspects of that. New Zealand is a case that's
15 extraordinarily interesting, warrants attention, because
16 being a small economy, it's easy to get HHIs if you don't
17 count international competition that are very, very high.
18 There, you have had a circumstance where industries have
19 been completely deregulated and essentially contestability
20 has relied upon the discipline behavior of incumbent firms,
21 and it's working.

22 I have just actually finished an article which I
23 hope is coming out in the Journal of Economic Literature
24 which is on the reforms and which focuses on the use of
25 contestability as a concept, at least in part, to regulate

1 industries, and the authorities there are quite willing to
2 completely deregulate what we might want to think of as a
3 monopolist. It's got a domestic market, even when there is
4 no imports, but if the domestic firm is pricing against
5 imports. So, you know, they are keeping just a wisp of low
6 imports just to keep them out, and I do think the general
7 questions you're asking, which is to look at international
8 comparisons, I think we do far too little of it.

9 PROFESSOR WHITE: I agree.

10 PROFESSOR TEECE: There is this sense that
11 antitrust was invented here, and yes, it was invented here,
12 but it has been applied in different ways in different
13 countries, and there is almost no scholarship -- it is
14 really quite pathetic -- that attempts to be comparative and
15 to bring back to the United States the lessons from
16 different regimes as they exist abroad. I'm not necessarily
17 saying that there are any better anywhere else, but there
18 are certainly lessons to be learned.

19 COMMISSIONER VARNEY: I would assume Professor
20 Teece -- well, maybe not, this is not your area -- but are
21 you familiar with our Boston Scientific and our American
22 Home Products Consent decrees?

23 PROFESSOR TEECE: No, I'm sorry, I'm not.

24 COMMISSIONER VARNEY: They -- if any other
25 panelists want to, please jump in, but they were two consent

1 decrees that focused on a product market. Let me take
2 American Home Products, it was a merger of two companies,
3 diversity of assets, but there were two areas of overlap.
4 They were two of only three companies who were well on the
5 road to developing a rotovirus vaccine, and perhaps in
6 Professor White's analysis, we didn't have a problem,
7 because these were future products, but they were products
8 five or six years down the road, no certainty that they were
9 going to get through the FDA approval process, no certainty
10 of their efficaciousness.

11 We required that they, as part of the transaction,
12 license or divest what would now be the joint R&D on this
13 rotovirus vaccine. How would you approach that kind of
14 analysis or would you not?

15 PROFESSOR TEECE: Well, and in product markets,
16 were there significant overlaps or was it kind of like a
17 GM-ZF circumstance or --

18 COMMISSIONER VARNEY: Susan, why don't you
19 response. You are more familiar with GM-ZF than I am.

20 MS. DESANTI: It was not like GM-ZF in the sense
21 that GM-ZF was focused on markets where the people who were
22 merging were not actual competitors. These were two
23 companies who were competing at the time in separate
24 research and development tracks, both to develop the
25 specific same vaccine, a rotovirus vaccine. So, it is a

1 vaccine for the same application, it was actual competition
2 at the same time, in the present.

3 PROFESSOR TEECE: Well, let me answer it in a
4 general sense about how I would look at such things. You
5 know, what my framework says is that, you know, I don't see
6 any strong or statistical evidence that concentration of R&D
7 relates to subsequent performance. That's not to say that
8 it's completely unimportant, but I'd like to know why is it
9 these firms are merging. I mean, very often firms that are
10 doing very similar R&D have to or decide they want to get
11 together. You see this a lot in biotech, because they lack
12 the complimentary assets.

13 You know, someone lacks manufacturing, someone
14 lacks distribution, someone lacks something that's unique,
15 and in those cases, you know, absent a complementary assets,
16 the innovator really doesn't get a chance to capture a
17 decent return from the innovation. So, if I saw that going
18 on, I would tend to be permissive. If it was pure, you
19 know, everyone had the complementary assets and this was
20 purely, you know, eliminating competition, then I would
21 probably be very concerned about it.

22 COMMISSIONER VARNEY: Well, that may be Boston
23 Scientific, which is another public case that we have
24 already concluded. There we had two firms, eventually
25 three, that were the sole competitors in the U.S. market for

1 cardiovascular imaging technology, and we had a -- what many
2 of us thought was a good synergy. One of the firms was a
3 venture capital firm that merely owned the patent and didn't
4 look like to many of us like the product was ever going to
5 get to market. The other firm was the firm that was really
6 looking like it was going to get the next generation of this
7 technology to market if it was coming to market sooner than
8 anybody else, yet we were very concerned that what we had --
9 taking out the third firm for a moment, which whether or not
10 it was in direct competition I think is still argued by some
11 of us -- that we -- some of us saw it as a merger to
12 monopoly on the R&D side, and again, we required the
13 divestiture and cross-licensing of the most -- of the entire
14 patent package.

15 PROFESSOR TEECE: You know, the notion of, you
16 know, monopolizing R&D is almost an oxymoron for me. I
17 mean, that's one of the problems I have. I mean, it is true
18 that Gilbert and Sunshine tie it way back, as they should,
19 to very specific assets, but, you know, absent some very
20 specific assets and lots of them that no one else can
21 produce, then R&D is going to be one of the hardest things
22 around to monopolize.

23 COMMISSIONER VARNEY: Are patents a very specific
24 asset?

25 PROFESSOR TEECE: Yes, yes, they are, but patents

1 in R&D aren't -- patent is the output of R&D.

2 COMMISSIONER VARNEY: That's true.

3 PROFESSOR TEECE: The R&D process itself, because
4 of the fluidity of ideas --

5 COMMISSIONER VARNEY: But to bring the R&D to
6 market, you have to resolve the patent asset conflicts.

7 PROFESSOR TEECE: Yes.

8 COMMISSIONER STEIGER: And in these two cases if
9 you had, let's assume hypothetically, too evenly matched
10 folk doing specific R&D, they don't need anybody else's
11 assets to continue down the track they are going, then the
12 result of doing nothing would be that the merged group
13 would, indeed, lock up this, quote unquote, R&D through a
14 patent for a minimum of, what, drugs, devices, 17 years.
15 How would you weigh that in your mind if you are looking at
16 the competitive effects --

17 PROFESSOR TEECE: But it is not a product. No one
18 is locking up the R&D. What you are doing is locking up the
19 product, am I correct, and that's why -- why can't the
20 existing apparatus deal with that I suppose is the question.

21 COMMISSIONER VARNEY: So, what I'm hearing a bit
22 of is wait a minute, you know, we're all getting a little
23 bit in front of ourselves here. What we are sometimes
24 addressing as an R&D market or an innovation market can
25 often be tied to an actual product market and what we ought

1 to be doing is in your view taking this analysis out to its
2 extreme and doing a product analysis as opposed to an R&D
3 analysis. Is that --

4 PROFESSOR WHITE: That's certainly the way I see
5 it.

6 MR. BAKER: May I follow up?

7 PROFESSOR WHITE: Yes.

8 MR. BAKER: Suppose we had two firms who decided
9 they wanted to invent a better widget and one hired Patel to
10 do R&D and the other hired Arthur D. Lyttle, and Arthur D.
11 Lyttle and Patel are the only two establishments that have
12 anything like the expertise that would be needed to really
13 think about how to make better widgets, and so there is some
14 sense they are R&D-specific assets that are lodged in those
15 two firms and nowhere else, and this -- whether the R&D will
16 pay off that we're hiring -- the two firms are hiring Patel
17 and ADL to perform is not at all certain. It's a question
18 of probability and we just don't know when and whether.

19 Now, in that set-up, I think I set it up so that
20 there is a very clearly defined demand for R&D, and -- they
21 are a market, a price that they have paid Arthur D. Lyttle
22 for R&D and a -- a market transaction for R&D, and what I
23 thought I heard you guys saying was that -- your point was
24 well, maybe that one might be a situation where we might
25 worry about a merger of Arthur D. Lyttle and Patel, because

1 it might -- we could understand that they are direct
2 competitors in an R&D market, but that we -- but that if we
3 change the facts and instead of the two -- the R&Ds going on
4 in either Arthur D. Lyttle and Patel, instead they are going
5 on captively in the two firms, we might have more trouble in
6 analyzing that situation through the technology of an R&D
7 market, through the approach of that, because the fact that
8 the prices will not be transparent to us and what is going
9 on will be difficult to understand.

10 Is that what you are saying, or are you saying
11 something stronger than that, that in my hypothetical, there
12 isn't even in principle the possibility of defining an R&D
13 market, despite what I perceive to be a downward slip in the
14 demand curve for R&D in that set-up or a function that's
15 capable of being monopolized?

16 PROFESSOR WHITE: These issues of vertical
17 integration are always difficult ones. For sure, if in your
18 hypothetical Arthur D. Lyttle and Patel merge, I, and I hope
19 the Commission, would have an antitrust problem, for sure.
20 If instead your potential widget producers merge, I think
21 you basically have to focus on the widget market and not
22 R&D. I just -- because it is much less transparent, I don't
23 know how to deal with it, except in the notion of a market,
24 a real market.

25 COMMISSIONER VARNEY: But can't you get to a real

1 R&D market? You know, when we go back to the rotovirus
2 example, there is no rotovirus vaccine on the market?
3 Let's suppose theoretically or hypothetically that it is not
4 even in clinical trials yet, that they are both working on
5 different research paths that they both are confident is
6 going to bring them to a desperately needed vaccine in the
7 Third World. You're telling me that we don't need to get
8 into an -- what we are calling an innovation or an R&D
9 market analysis, because what you have really got is a
10 product, however far out, you have got a product, so do the
11 product market analysis.

12 I'm saying but wait a minute, we don't have a
13 product. We have a bunch of scientists sitting around at
14 two different places who are thinking about how we can get
15 there. We don't want to -- and maybe we shouldn't care, but
16 we have this notion that competition is good in R&D, and we
17 would like to preserve it.

18 COMMISSIONER STEIGER: Let's add another example
19 from the real world, what if you had a merger between two
20 companies beginning to develop in some stage, let us presume
21 each is well on the road -- this is a hypothetical again --
22 not a new vaccine but a combination vaccine. Let us say one
23 that would inoculate against five childhood diseases where
24 there is currently a vaccine that inoculates against -- what
25 is it mother of three --

1 COMMISSIONER VARNEY: Right, DPT, three of them.

2 COMMISSIONER STEIGER: Now, that product doesn't
3 exist. Two active competitors. Why would -- with
4 Christine's question, shouldn't we consider that that
5 development in and of itself, even though the product does
6 not now exist, is an important competitive variable?

7 PROFESSOR WHITE: All right, I'll -- I'll -- look,
8 at some point you go far enough back that the thing is
9 speculative, and in that case, you say well, gee, these guys
10 may do it or these guys may do it or somebody else may do it
11 in David's paradigm of creative destruction may have some
12 relevance there, but you keep on talking about situations
13 that -- I mean, either the thing is really cloudy, in which
14 case there is lots of possible innovators, or more likely,
15 you seem to have a pretty notion that, you know, there are
16 really only two likely developers here, they are pretty far
17 down the road, and I think it's the end points of the road
18 that one focuses on, and I -- if you don't do that, you are
19 just counting noses, and counting -- without the -- without
20 the other indicia of markets, I'm very uneasy about just
21 counting noses. I don't know what one has --

22 COMMISSIONER VARNEY: But you all aren't going to
23 come back to us if we start doing it your way saying wait a
24 minute, there is no product, you are talking eight years
25 out, you are talking nine years out. You have got no solid

1 -- not R&D, but, you know, you people are being far too
2 speculative here. You should have let this merger go
3 through without the cross-license or divestiture, because
4 you don't have a product. At best, you have got a
5 speculative product, maybe seven years out, maybe eight
6 years out.

7 PROFESSOR TEECE: Let me turn the argument back on
8 you, Commissioner Varney, and pick up where you were before,
9 and Jon then handled the problem nicely, because he set up
10 the hypothetical so I couldn't argue with him, which is, you
11 know, there is no place else in the world they can do this
12 R&D. I mean, this is where I have the trouble, that, you
13 know, R&D is sort of very ubiquitous. It is true that
14 sometimes as you get into various aspects of it, there is
15 some very specific assets involved, but in the main, this is
16 stuff that can move with alacrity around the world, that
17 there is all kinds of companies out there that they don't
18 think of that are in a field that can readily be in that
19 field, and so, you know, as a practical matter, the problem
20 is that there is just many, many, many potential entrants,
21 and our ability to go find them and count them is limited.

22 So, we just set up the hypothetical that yes, you
23 boxed it in and you're absolutely confident that there are
24 no such players, you have assumed away the problem, I think.

25 COMMISSIONER VARNEY: Well, let's ask Professor

1 Mowery to comment on that, though, because this morning he
2 said something I thought which was a little different, and
3 that was in some industries, at least, the process and the
4 manufacturing, the product and the process are so tightly
5 tied together that --

6 PROFESSOR MOWERY: Vaccines is a good example.

7 COMMISSIONER VARNEY: -- that you can't just move
8 it around. Do you have any comments on this discussion,
9 Professor?

10 PROFESSOR MOWERY: Well, I tend to agree with
11 Professors Teece and White that it's not obvious to me what
12 the focus on the upstream R&D market buys you or innovation
13 market buys you, and I think the other -- the other
14 trade-off or the other issue that comes up here is that the
15 rotovirus example is, I think, illustrates at least one
16 problem, which is, as you know and as you probably heard in
17 great detail, the costs of bringing one of these things to
18 market, obviously having -- are so high that having two
19 teams working on it is by no means -- doesn't say much about
20 the willingness or the probability of both firms to actually
21 put this thing through trials and bring it to market for
22 non-industrial economy diseases for which the market is both
23 -- the price is low and the demand is very uncertain.

24 So, by focusing so heavily on the R, one runs some
25 risk of omitting what my colleague here has referred to as

1 the complementary assets issue, which is in many cases a
2 more determinative issue in influencing competition in the
3 product market. But I -- so, I think it's just not clear
4 to me what you're gaining by focusing on the -- this
5 "innovation market," when in many cases you're looking at a
6 phase of the process that is several stages removed from the
7 ultimate competitive outcome, which is really the one that
8 matters for consumer welfare.

9 COMMISSIONER STEIGER: May I introduce another
10 variable and ask how we should factor it? Let us presume,
11 hypothetically, in any one of these examples that we can
12 identify a market for the outcome of the partial technology,
13 let us say the R&D that's going on for a product that we
14 willingly tell you doesn't exist, but two people are still
15 doing it, and we can identify for you on paper a vibrant
16 market that is quite interested in being able to play off
17 both from a quality point of view and a price point of view
18 this particular five-shot vaccine or new catheter, imager or
19 whatever it may be in the real world.

20 What weight do we give to the existence of this
21 supposed market for the non-existent product?

22 PROFESSOR MOWERY: Well, again, speaking -- if
23 Professor White was on thin ice, I'm probably -- I have got
24 one foot in the water I suspect, but, I mean, it seems to me
25 there you -- you are at least coming closer if you have got,

1 as is the case in a vaccine industry, you have got a lot of
2 cross-licensing, you have arm's length transactions, you
3 have the assembly of portfolios of patents to bring out a
4 specific -- a specific vaccine. Then you -- it seems to me,
5 anyway, you do have a more nearly identifiable market than
6 you do when dealing with in-house R&D, but again, it seems
7 to me you are implicitly still employing the criterion that
8 Professors Teece and White here are advocating, which is
9 implicitly you're still taking as the ultimate determinative
10 consumer welfare competition in the product market, and it
11 seems to me that that is the appropriate criterion, and it's
12 not clear to me what you are gaining by creating this other
13 concept of an innovation market that is meaningfully
14 separable from competition in the product market.

15 COMMISSIONER VARNEY: I would like to hear
16 Professor Whalley's thoughts on that.

17 MS. WHALLEY: Well, I think that the point you
18 just made is really important, and that is that there is a
19 great risk here of getting lost in what is, in essence,
20 semantics, and, you know, it's hard to believe that as an
21 antitrust lawyer I would say it doesn't really matter what
22 you call something, having lived with per se and rule of
23 reason for all of these years, but I think for our purposes,
24 in trying to think about when it's appropriate to challenge
25 these sorts of combinations, because they will have an

1 adverse effect on innovation, it's much more important to
2 focus on what are the criteria that would determine there's
3 a likely anti-competitive outcome. You know, is this
4 question of specialized assets an appropriate way to
5 identify the players? How do you balance out the synergies
6 and the efficiencies. How do you evaluate the benefits from
7 reducing redundancy in very expensive R&D as opposed to
8 losing the benefits of competition between alternative
9 methods? Those to me are the really critical questions to
10 be addressed.

11 Ultimately, the agencies have to make a decision
12 if they go to court as to how to plead this. Do you plead
13 it as an innovation market or do you plead it as an adverse
14 outcome in future product markets? And maybe the courts
15 won't accept either one, but I think the likelihood that
16 such an argument can be supportable is going to depend on
17 how well the adverse effect can be articulated and the
18 criteria for determining those adverse effects and that they
19 are met in a particular industry. So, I think that you're
20 headed --

21 PROFESSOR MOWERY: I might just make one other
22 very brief point.

23 COMMISSIONER STEIGER: But I want you to answer
24 another question related to it, so don't go away.

25 PROFESSOR MOWERY: Again, I think the example of

1 vaccines is a very interesting one, and it is surprisingly
2 one of which I know a little bit, because I worked with some
3 national research councils on vaccines, but research doesn't
4 -- I mean, again, you have a lot of small biotechs doing
5 research on new vaccine products and the like, and the track
6 record on their ability to bring these things to market is,
7 in fact, quite mixed, both because of their competence at
8 managing clinical trials, but also because of the uniquely
9 tight link between process and product in vaccines and the
10 associated very high costs of development of these products,
11 which translates them into marketable preparations,
12 development costs whose substantial size, of course, is in
13 part a result of regulatory intervention.

14 So, looking exclusively or looking largely or
15 giving a heavy weight to the R, without looking at these
16 downstream components, I think, at least creates a risk of
17 creating a distorted view of what the likely competitive
18 consequences in product markets are of certain actions or
19 inactions.

20 COMMISSIONER STEIGER: Tell me why that shouldn't
21 make me even more concerned about two competitors who are,
22 quote unquote, "down that innovative road," past step one or
23 two of testing, but the question I wanted to ask Judy,
24 because it leaps immediately to mind, one of the criteria
25 you asked that be considered is when is it a more

1 competitive result, if I understand it, to avoid duplicative
2 R&D. I sure would like to know how I am supposed to know,
3 particularly in the biotech sciences, what is duplicative
4 R&D. I might know it with a widget, maybe if they bring me
5 the two things, but how would I know whether it's
6 duplicative to have somebody going down road A on a
7 rotovirus? I don't know what road B is or road C. In fact,
8 the FDA is studying it, let us say hypothetically. So, how
9 can I factor in "redundancy"?

10 MS. WHALLEY: I'll give you just some thoughts
11 about questions that you might ask, and I'm sure there are
12 many more than these, but it would seem to me that important
13 questions to ask would be what has been the company's
14 history in terms of -- and companies generally in the
15 industry -- history of successfully bringing products to
16 market? How important is having a number of investigators,
17 researchers conducting research? How likely is it that the
18 costs ultimately are going to deter the innovation from
19 going forward to conclusion? Would the combination of these
20 firms and the savings associated with eliminating
21 duplicative R&D make it more likely that the combined firm
22 is actually going to succeed at the end as opposed to maybe
23 we'll have two companies going forward, but it's
24 sufficiently costly and risky that neither of them proceeds
25 to the end or proceeds much more slowly?

1 Those are not easy questions to answer. Obviously
2 they are going to be fact-intensive and determined in the
3 case of each market, but it's a very important question to
4 think about whether, you know, how are you going to have the
5 most competitive result? Through the elimination of the
6 redundancy or with the loss of competition or having
7 competition but more expensive programs?

8 COMMISSIONER VARNEY: Right. It is interesting
9 that you pose this series of questions, because in the real
10 cases that have come before us, we have not prevented the
11 transaction, we have allowed the transaction to go forward,
12 and the parties have generally agreed to license out the R&D
13 or the processes or the patents to any third bidder, and we
14 are not yet at the conclusion of the time period in which
15 they have to license out. So, presumably, we are going to
16 have some answers about the duplicativeness and the cost
17 barriers in R&D, because if we don't get any takers to buy
18 the licensing rights, I think we may have a good indication
19 to the answer to some of those questions, but we don't get
20 to that answer unless we put it out on the market and let
21 the market tell us. We have got probably about 15 more
22 minutes, and I think Susan and maybe Jon and some others
23 have a slightly different take on this.

24 MS. DESANTI: I have one question that I want to
25 direct to David and Larry and then I would like to defer to

1 some other people at the table.

2 Isn't your argument that you can't monopolize R&D
3 basically a version of whether you take a short run or a
4 long run approach to this? I mean, in the long run, of
5 course you can't monopolize R&D, potentially there are
6 others who might be entering, but in the short run time
7 frames, two, three, four years, especially in these FDA
8 markets that the Commission has been looking at, there are
9 not other people who are -- who are that far down along the
10 pipeline who are going to get to the same place as quickly
11 as the people who are already farther down, closer to the
12 ultimate future product.

13 If you -- this really -- this relates to my
14 question about your testimony overall. My sense of your
15 testimony is that if the Commission take a long -- more of a
16 long-run point of view, your answer is you don't need to
17 interfere, the market will take care of things, the next
18 generation of product will appear, but are you, in fact,
19 arguing, then, that we should -- that the Commission should
20 tolerate some short-term exercises of market power that are
21 not efficiency driven necessarily but come about because of
22 mergers or other particular transactions?

23 PROFESSOR TEECE: I think that, you know, the
24 pharmaceutical case is a very, very special case, and I
25 wouldn't want to be, you know, sort of generating general

1 policy prescriptions based on it, but, you know, what the
2 FDA process does do is it does sort of lock in its starts to
3 some extent, but not entirely so, but it doesn't prevent
4 more people from coming in behind, and, you know, I come
5 back to the fundamental point, you know, unless you can tie
6 up scientists, you really can't monopolize an R&D market
7 very well at all.

8 MS. DESANTI: But couldn't you exercise market
9 power in some short-run time frame?

10 PROFESSOR TEECE: Possibly. Let me say possibly,
11 but, you know, should that be the concern of the agency?
12 Let me -- you are trying to fine tune public policy at a
13 level that I think, given our understanding of these issues,
14 is not appropriate.

15 MS. DESANTI: Well, let me just say that you may
16 think that the pharmaceutical markets are not a good
17 example, but in five out of six of the most recent consent
18 orders, those are the issues that have confronted the
19 Commission, so they don't feel unique to the commissioners
20 that have to decide these cases.

21 I want to defer to Bill Cohen who is project
22 director for innovation in our shop, who has been an
23 intellectual force getting us to an understanding of these
24 issues.

25 MR. COHEN: I have a question for Professor Teece.

1 Trying to get a little bit more of an insight into the
2 relationship between hypothetical price increase tests,
3 hypothetical attribute changes and the way he thinks that
4 they would operate, let me give you a hypothetical situation
5 and see how your approach would deal with it.

6 Consider applying a 5 percent hypothetical price
7 increase and finding that your market includes firm A and
8 firm B, and then applying a 25 percent hypothetical
9 attribute change and finding that your market includes firms
10 A, B through K, for example. What do we do at that point?
11 Do we regard this as a duopoly and find a possible
12 competitive problem, or do we regard the market as
13 relatively unconcentrated?

14 PROFESSOR TEECE: Is it that you get -- let me
15 understand. Are you getting -- when you do the performance
16 or the attribute test, you identify a different group of
17 competitors?

18 MR. COHEN: A different and larger group.

19 MS. VALENTINE: Right, A through K.

20 PROFESSOR TEECE: Well, then, you know, you would
21 include those in the market.

22 MR. COHEN: Well, then, aren't you possibly losing
23 an ability to challenge a merger in which a price could be
24 increased to consumers?

25 PROFESSOR TEECE: Well, you know, we're -- we're

1 -- hang on, let me make sure I understand this. If you have
2 got an attribute, you raise -- you go through the process of
3 saying well, what will happen here if there is a degradation
4 in the performance of this attribute, and you identify
5 competitors that way, and you come up with a market. Okay,
6 once you have defined the market, then the analysis would go
7 father as it would with any other merger, at least that's my
8 proposal, and what's your problem with that?

9 MR. COHEN: Well, at one point you had talked
10 about running alternative tests, looking at various
11 attribute, looking at a price attribute -- looking at price
12 as one competitive variable and looking at the attributes as
13 another competitive variable, and now I am posing the
14 situation where you are getting different results.

15 PROFESSOR TEECE: I see what you are doing. Well,
16 first of all, you do it only on the attributes which
17 consumers decide is important. Now, there is a case that
18 there may be some inconsistencies there, and that's -- I
19 admit that at that point you have to make a qualitative
20 judgment call on what should belong in the market and what
21 shouldn't. It is not a precise approach, but it does enable
22 you to capture a different dimension in competition.

23 By the way, I don't think on any of these issues
24 that we have fully worked out the answers, and coming back
25 to where Mr. Donaldson was this morning, to some extent,

1 because we haven't, is one reason why I think we have to be
2 very cautious here, because this conversation I know is
3 making some people feel like there is uncertainties in the
4 process, and the more that we're unsure about these things,
5 then there's a greater level of uncertainty, which causes
6 some stomach churning and concerns, and that's why I think
7 we kind of acted -- we kind of have to get these issues
8 worked out before it starts sort of popping up in policy
9 and in case decisions.

10 MR. COHEN: Let me also just turn quickly to some
11 practical issues that might arise in an attribute-based
12 definition. What would you or how would you go about
13 applying this in the type of market where innovation occurs
14 in large and difficult to predict jumps as opposed to a, you
15 know, a very smooth path which you might be able to foresee?

16 PROFESSOR TEECE: Well, you know, it -- if the
17 product that you're -- the product market you're focusing on
18 was one where people focus on these attributes, then that's
19 what lets you go forward with this attribute analysis.

20 Now, I think you're asking a separate question,
21 which is well, but suppose you believed that those
22 attributes are not stable in some sense, that -- you know,
23 if you take microprocessors right now, people are selecting
24 on the speed, they are selecting on power, they are
25 selecting on reliability, and what you are asking me is

1 well, suppose that next year, are they going to select on a
2 completely different set of criteria because of some radical
3 new innovation? Is that right? Well, then you would have
4 to do the analysis over again.

5 MR. COHEN: I guess I'm focusing more on sort of a
6 discontinuous set of attributes where you don't --

7 PROFESSOR TEECE: You can have discontinuous
8 innovation and a fairly continuous set of attributes. So,
9 it could be like one attribute advances, like speed advances
10 in some period more than another and so forth. I think, you
11 know, once again you would have to take not just one
12 snapshot, but you would have to go back a little bit and
13 then try and work out what the technological trajectory is
14 going forward and do a forward looking analysis like you
15 would try to do in any other circumstance.

16 PROFESSOR WHITE: But, David, unless one is going
17 to use a hedonic approach and translate it into a dollar
18 equivalent -- I mean, you know, take your imaging analogy
19 again, you know, invasiveness. I don't think we would want
20 to ask, you know, now how deeply, you know, into the skin
21 does something have to be inserted, but rather, it's a
22 question of --

23 PROFESSOR TEECE: You start from when -- just as
24 you don't ask if the price goes up by \$20, you ask if it
25 goes up by 5 percent. So, you know, it's no different from

1 the existing formulation in that regard.

2 COMMISSIONER VARNEY: I want to go back, Professor
3 Teece, to the thought you just echoed, and that is that
4 there is at least some business uncertainty in how we're
5 approaching all this, and I think it's -- from my
6 perspective, it's important to note that in the cases that
7 we have dealt with so far, the innovation, the R&D, the
8 potential products have not been the driving force for the
9 transaction. They have been a part of the transaction, and
10 the parties have at least so far more or less readily agreed
11 to a divestiture of the R&D that would then be overlapping.

12 I don't think the Commission has yet seen,
13 although maybe it's in the works, a straight merger where
14 the assets were primarily or what was driving the
15 transaction was complementary R&D, and so far in these
16 hearings we have heard lots of arguments about why in some
17 industries that is going to be a necessary and, in fact,
18 good action in some industries. So, we have yet to put the
19 pedal to the metal on some of these tests, and we will see
20 where we end up.

21 Jonathan?

22 MR. BAKER: Thank you. Thank you, Christine. I
23 have a couple questions for David, but I don't want to be
24 accused of piling on here, so I will --

25 COMMISSIONER VARNEY: So, you want the fair game

1 theory, right?

2 MR. BAKER: Let me just say that there is much to
3 admire in the spirit of the proposal for thinking about
4 market definition and high-technology industries. The focus
5 on the importance of innovation that we are increasingly
6 seeing is really critical here, and not just cost reducing
7 and price reducing innovation, but innovation that enhances
8 features and improves quality, and we need to be conscious
9 of that and thinking of ways to encourage that, as well.
10 And in addition, your proposal also encourages us to be
11 forward looking, and that's another terrific advantage of
12 it, too, but now let me get to my questions.

13 I'm picturing the attribute-based method of market
14 definition as expanding markets beyond what the current
15 conceptual experiment in the merger guidelines, based on --
16 that uses price would expand -- would define, because
17 otherwise, what's the point? So -- and in particular, we
18 are moving to include products that aren't particularly
19 close substitutes for the ones that we would now consider in
20 the market today, but that have some attributes that could
21 be improved, and then they would be substitutes, and I have
22 two questions for you that come out of that picture.

23 The first is isn't there something of a moving
24 target problem here, that well, problems with products that
25 are not now substitutes may get better, but so will the

1 products that are in the group today? Perhaps the products
2 outside the group will never be substitutes for the products
3 that -- that we would include in the market today. Am I --
4 just to put that on the table.

5 My second question is, presumably the products
6 that we're adding to the market beyond the products we
7 already include based on our conceptual experiment on price
8 are products that the -- that would require significant sunk
9 investments in the quality enhancement in order to become
10 competitive under the terms of the price test, because if
11 they didn't require sunk investments, they would already be
12 considered uncommitted entrants and be assigned market
13 shares and included as in the market today.

14 And so the point of the -- of the conceptual
15 experiment that you're proposing is really to broaden the
16 market beyond how we think of competition today. I take it
17 it must mean that the firms -- that the products that we are
18 adding to the market need to be modified through sunk
19 investments, significant sunk investments, in order to be in
20 the market. If we're adding -- if we're broadening our
21 product market to include products that can only become
22 substitutes because sunk investments must be made, don't we
23 have to ask the question of whether it would be profitable
24 for the firms to make that -- that investment?

25 That's the question that the entry likelihood test

1 leads us to ask in the merger guidelines today about those
2 products. If we adopt your proposal for broadening product
3 markets by -- through attribute-based competition, aren't
4 we, in effect, avoiding the entry likelihood question?
5 Aren't we assuming that firms who could technically improve
6 their products through the sunk investments would find it
7 profitable to do so, and is it right to avoid the entry
8 likelihood question under these circumstances?

9 PROFESSOR TEECE: Well, they are both extremely
10 good questions, and my answers will be incomplete, but let
11 me begin by saying why I don't think as a practical matter
12 that you really mind an attribute test, and let me begin
13 with an example or what got me into this.

14 I was once working on an antitrust case where the
15 company made a vascular graft, it was Gore, and it was made
16 of Gortex, and there was a competitor, a clone, who actually
17 arguably misused or should I say infringed the patent and
18 made their own vascular graft of the same substance. You go
19 out to the doctors and say what would happen -- of these two
20 graphs, they perform the same function, made of the same
21 material, but there is different suturability in one and
22 different longevity possibly, but you ask the doctors now,
23 if the price went up 5 percent on this graft over here,
24 would you say -- the answer is always no, of course not, of
25 course not, so you end up -- this is an innovative

1 technology, but this is an extraordinarily narrow market, so
2 it doesn't make sense.

3 So, in that sense, I think you would have to agree
4 with me, and I'm glad to see Larry and Ms. Whalley do, that
5 attributes are important and have to be put into the
6 equation. Having said that, coming to your questions, is it
7 a bit of a moving target, yes, I think it is, but in
8 innovative markets, things are moving and to some extent we
9 have to deal with that.

10 Your second question, which I can't answer very
11 well off the top of my head, but I will go think about it
12 and write an essay on it, because that's the type of
13 complexity that's in your question, is whether or not we are
14 really side stepping more thorough entry that's proper.
15 There may be a little bit of that going on, but I'm not sure
16 that that necessarily vitiates the test. It's a pretty good
17 first progression approximation, but I will think through
18 that point, because I think it's a very important one, and
19 I'll let you know in due course whether or not I think it's
20 a back door way of doing something that you're currently
21 doing. I don't think it is in it's entirety.

22 PROFESSOR WHITE: Or you will read about it in the
23 American Economic Review.

24 COMMISSIONER VARNEY: We will eagerly anticipate
25 that publication.

1 Howard, do you have any questions?

2 MR. MORSE: I think I would be just piling on and
3 addressing -- and addressing the same and asking the
4 questions from a slightly more practical direction. So, I
5 don't think it's necessary.

6 COMMISSIONER VARNEY: Does anybody else around the
7 table have any other questions for this afternoon? Well, I
8 want to thank our panelists and our participants very much.
9 I think you have advanced our understanding and certainly
10 helped us refine how we think about these issues when there
11 is not a product on the table but likely to be one. I think
12 we have all agreed that no matter what we call it, we do
13 have some concerns about products coming to market and how
14 we make sure they get there in the most efficient manner
15 without -- without running afoul of the antitrust laws, and
16 I think we will learn more about it tomorrow when we
17 reconvene.

18 Thank you all for coming.

19 PROFESSOR TEECE: Thank you.

20 (Whereupon, at 4:00 p.m., the hearings were
21 concluded.)

22 //

23 //

24 //

25 //

C E R T I F I C A T E

DOCKET/CASE NUMBER: P951201

CASE TITLE: HEARINGS ON GLOBAL AND INNOVATION-BASED
COMPETITION

HEARING DATE: October 24, 1995

I HEREBY CERTIFY that the transcript contained herein is a full and accurate transcript of the notes taken by me at the hearing on the above cause before the FEDERAL TRADE COMMISSION to the best of my knowledge and belief.

DATED: October 24, 1995

SIGNATURE OF REPORTER

Susanne Q. Tate
(NAME OF REPORTER - TYPED)